nac
IMAGE TECHNOLOGY

800457-0H

High Speed Camera System

MEMRECAM ACS-1

MODEL ST-877

User's Manual

· Please read the User's manual and use it correctly and safely.
· Keep the User's manual with the product.

February 2024

Read Before Use

Information to the User

FCC Information

Note:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance information.

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

U.S. Responsible Party :   nac Americas Inc.
Address :   193 Jefferson Ave, Suite 102 Salem, MA 01970 USA
Tel. No. :   1-833-600-0261

Product name	Basic Model no.
MEMRECAM ACS-1 DRP	MODEL V-1009

CE marking

This product with the CE marking complies with the EMC 2014/30/EU.

Features of This Unit

The MEMRECAM ACS-1 is a high speed digital camera designed to analyze the phenomenon of movements that are faster than the eye can see.

High Speed · High Resolution Image Sensor

Equipped with a highly sensitive CMOS sensor to enable high speed operation at high resolutions.

Type	At maximum resolution (nomal mode)		At maximum speed (nomal mode)	
	fps	pixels	fps	pixels
ACS-1E	35,000	1280 × 896	220,000	1280 × 96
ACS-1 M60E	54,000	1280 × 896	220,000	1280 × 176
ACS-1 M40E	35,000	1280 × 896	220,000	1280 × 96
ACS-1 M30E	25,000	1280 × 896	220,000	1280 × 96
ACS-1	35,000	1280 × 896	540,000	1280 × 16
ACS-1 M60	54,000	1280 × 896	1,000,000	1280 × 16
ACS-1 M40	35,000	1280 × 896	700,000	1280 × 16
ACS-1 M30	25,000	1280 × 896	500,000	1280 × 16

Also, the custom frame rate function enables the frame rate to be set in units of 10 frames per second for 50 frames per second and higher.

High Sensitivity

Recording is possible in a variety of conditions.

Sensitivity	Mono	ISO 50,000:	ACS-1/ACS-1E
	Mono	ISO 100,000:	ACS-1 M60E/M60/M40E/M40/M30E/M30
	COLOR	ISO 20,000:	ACS-1 M60E/M60/M40E/M40/M30E/M30

iii

Integrated Housing

The integrated system housing the recording memory in the main camera unit seals in the internal electronic circuits with a durable structure that does not come into contact with outside air.

Superior Performance

High speed photography requiring advanced techniques can be easily performed.

While remote operation from a PC is possible using the included software, the function of live image display to a monitor with a simple operation using a dedicated remote control (V-PAD) makes it possible to perform recording and analysis without using a PC.

Perform continuous recording to the semiconductor memory or via the record trigger input with confidence that images will not be accidentally lost. Furthermore, various phenomenon may be captured and recorded by multi-trigger recording (recording of multiple phenomenon by receiving a plurality of trigger signals), burst recording (recording only during the time that the trigger signals are active), or by the image trigger function (recording by detecting the change in intensity in a specific region).

Flexible Image Playback

Slow motion playback of recorded images or repeated playback in a specified range is possible. Detailed image analysis can be conducted with video output or on a PC.

High-Speed Network Transfer

Recorded images can be digitally saved to a PC through the network, including the data settings during recording and the trigger timing. 1000BASE-T/100BASE-TX ethernet is used for high speed transfer, even for large amounts of video data with high resolution/long recordings. Also, direct saving to a USB compatible external storage media connected to the USB port of the main camera unit is possible.

Various External Interfaces

Equipped with various external input/output interfaces, including 1000BASE-T/100BASE-TX ethernet, USB2.0/USB3.0/USB3.0microB, recording start signal input, IRIG-B signal input, discrete status signal input/output, exposure pulse signal output and recording trigger signal input. The system is compatible with a wide range of recording conditions.

Trademarks

MEMRECAM is a trademark of nac Image Technology.

Microsoft Windows is a registered trademark of Microsoft Corporation USA.

Other company names and product names noted here are trademarks or registered trademarks of those companies.

This document contains the description of Ver. 2.14 of the ACS-1 firmware.

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The photographs and external appearance of the products in this document may change without notice.

The contents of this manual are subject to change without notification.

(00457)H

Safety Precautions

Be sure to follow these safety items to avoid damage or bodily injury.

■ Distinctions between the levels of bodily injury and damage

The distinctions between the levels of bodily injury and damage occurring from improper use are described below.

⚠ **Danger** Extreme danger that may result in death or serious injury.

⚠ **Warnings** Potential danger that may result in death or serious injury.

⚠ **Caution** Potential danger that may result in minor injury or damage to the device.

■ Warning Symbols

Descriptions are provided for the following warning symbols.

🚫	Prohibited item
❗	Mandatory item.

(00457)H

⚠ Danger

Using the AC Adapter (Common)

🚫   **●Do not use the camera unit dedicated AC adapter on anything other than that specified.**

(Malfunction or fire may occur.)

⚠ Warnings

Using the main camera unit

●**Do not disassemble or alter**

(Do not loosen screws on the main camera unit or open the cover even if the camera malfunctions.)

→ Contact the store where purchased for inspection · maintenance · repair.

●**Do not use in locations with smoke or flammable or corrosive gases, or strong magnetic fields**

(Malfunction or fire may occur.)

→ Do not use in dirty, dusty or humid locations.

●**Do not subject to strong vibration or impact**

(The MEMRECAM ACS-1 does not have vibration or impact resistance properties based on actual testing. If subject to strong vibration or impact, malfunction or injury may occur.)

→ Contact the store where purchased or our service center if using in such environments.

●**If there is a malfunction, turn the power off and unplug the device**

(If water or other foreign objects get inside, if the exterior breaks due to being dropped, if the camera becomes hotter than normal, or if smoke, odors or noises are emitted. The camera becomes warmer during operation so this is not a malfunction.)

→ Contact the store where purchased or our service center.

Using the cables

●**Do not unplug the cable with the power on.**

●**Do not put foreign articles such as metal, trash or water inside the connector.**

(Malfunction or electrical shock may occur if the cable is connected or removed with the power on.)

→ Contact the store where purchased for inspection · maintenance · repair.

●**Do not touch the plug or connector with wet hands.**

(Malfunction, electrical shock or fire may occur.)

⚠ Warnings

Check the input power

● **Check the input power before connecting.**

 ● During AC adapter use: AC100 to 240V/47 to 63Hz

 ● During DC power connection: DC20 to 32V

Using the AC Adapter

● **Do not disassemble or alter**

 (Do not loosen screws on the AC adapter or open the cover even if the AC adapter malfunctions.)

 → Contact the store where purchased for inspection · maintenance · repair.

● **Do not use in locations with smoke or flammable or corrosive gases, or strong magnetic fields**

 (Malfunction or fire may occur.)

 → Do not use in dirty, dusty or humid locations.

● **Do not subject to strong vibration or impact**

 (The AC adapter does not have vibration or impact resistance properties based on actual impact testing. If subject to strong impact or vibration, malfunction or injury may occur.)

 → Contact the store where purchased or our service center if using in such environments.

● **If there is a malfunction, turn the AC adapter power off and unplug the power cord.**

 (If water or other foreign objects get inside, if the exterior breaks due to being dropped, if the camera becomes hotter than normal, or if smoke, odors or noises are emitted.)

 → Contact the store where purchased or our service center.

(00457)H

⚠ Caution

Using the main camera unit

- **Do not block the release of heat from the camera**

  (The ACS-1 has a fan that cools the camera. Do not block the intake ports or vents. Additionally, do not place in narrow locations where there is no air circulation, or on carpet or bedding.

  If heat builds up inside, malfunction or fire may occur.)

- **Do not put fingers or objects in the lens mount**

  (The sensor is visible if the lens or cap on the lens mount of the camera is removed. If fingers or items are placed inside, the sensor may become scratched or dirty which may adversely affect the image quality.)

- **When mounted on a tripod, do not pick up by the handle of the device**

  (If mounted on a tripod, since the handle of the device will also take on the weight of the tripod, the handle may break and cause bodily injury.)

  → If mounted on a tripod, make sure to hold both the tripod and the main unit of the camera when carrying them.

- **Do not place heavy items on this device**

  (If tipped over or dropped, the exterior may be damaged, which may cause bodily injury. Additionally, if heavy items are placed on it, the exterior may be deformed, causing the interior components to be damaged and malfunction.)

- **Check the ambient temperature of the location where used and stored.**
  - Use temperature range: 0 to 40°C, humidity 30 to 80%RH, no condensation
  - Storage temperature range: -10 to 60 °C, humidity 20 to 80%RH, no condensation

Handling while moving or transporting

- **Use the dedicated storage case for moving or transporting this device**

  (To protect the camera from malfunction, use the optional dedicated storage case for transport)

⚠ Caution

Using the AC Adapter

🚫

●**Do not block the release of heat from the AC adapter**

(The AC adapter is cooled with a fan. Do not block the intake ports or vents. Additionally, do not place in narrow locations where there is no air circulation, or on carpet or bedding. If heat builds up inside, malfunction or fire may occur.)

●**Use environment**

- ●Avoid using in locations with smoke or corrosive gases, or strong magnetic fields.
- ●Do not leave in direct sunlight or locations subject to rain or salt water.
- ●Do not use in dirty, dusty or humid locations.

●**Check the input power**

(The AC adapter is AC100 to 240V, 47 to 63Hz so check the power voltage, frequency and polarity before connecting to a power source.)

❗

●**Check the ambient temperature of the location where used and the location where stored**

- ●Temperature range for use: 0 to 70 °C, humidity 5 to 95%RH, no condensation
- ●Temperature range for storage: -40 to 85 °C, humidity 10 to 90%RH, no condensation

●**Make sure unit is grounded**

(Ground with an AC3 pin connector. If not grounded, electrical shock may occur upon contact with the ACS camera.)

xi

(00457)H

⚠ Caution

Handling when moving or transporting the AC adapter

•**Turn off the power and unplug the connected cables**

(Make sure the power is turned off and the cables unplugged when moving the AC adapter. Fire, electrical shock or malfunction may be caused.)

Child does not play with this product

• Please keep children away from this product.

In addition to that mentioned above, unexpected problems may occur depending on the conditions of use of this device. Therefore, carefully read the various items mentioned in this manual as well as in the user's guides for the peripheral devices (or user's manual) before using. Additionally, immediately contact the store if there are any questions regarding this device.

(00457)H

■ Warning Symbols

There are warning labels and displays in locations on the device that require precautions for safe use. Please read these warnings before operating. Additionally, read the user's guide or instruction manual for safe and proper use.
Contact your local dealer if you do not understand your device.

Symbols Used on Warning Labels

symbols shown on the warning labels.

⚠	● Safety alert symbol This is an alert to you or other users of the potential danger during use of this device. Carefully read the message next to this symbol and follow the instructions for safe use of this device.
⏚	● Grounding terminal symbol Indicates the site of a protective grounding terminal. If not grounded, electrical shock may occur from the metallic and other parts of this device. Make sure to ground to avoid danger.
⚡	● High voltage warning symbol Indicates the site of high voltage that is dangerous if touched. When replacing fuses, make sure to unplug the power cable from the outlet. Do not open the cover. Depending on the device, some parts may generate high voltage internally so opening the cover may result in electrical shock.

MEMRECAM ACS-1 has a warning label on AC ADAPTER.

If the label peels off or characters disappear, please contact the dealer directly.
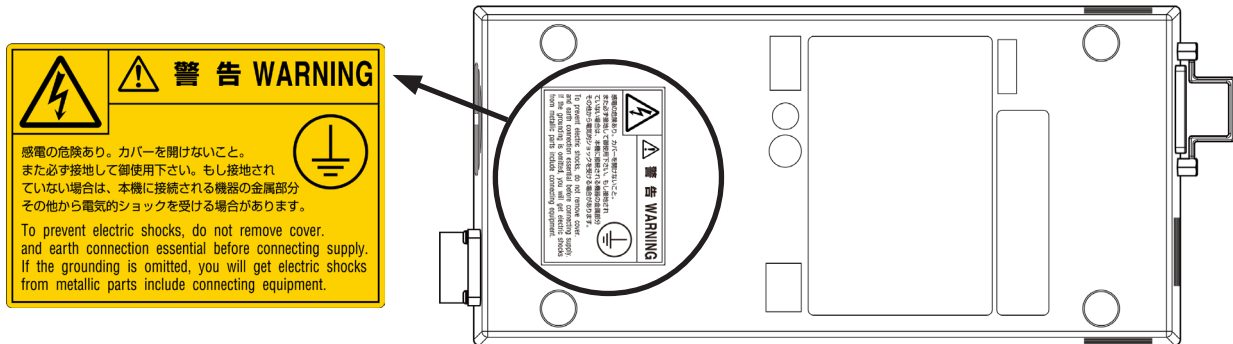
Regular Replacement of Parts

●Clock battery

Replace the battery for the clock installed in the MEMRECAM ACS-1 after about 5 years. Replacement cannot be performed by users so contact your local dealer or our service center.

Warranty

The warranty is valid for one year after purchase.

Refer to the attached warranty for details.

This Booklet

Select the Polarity for the External Input/Output Signals

■ Select the Trigger Signal Detection Method

Attention — When using external trigger signals for multi-trigger/multi-manual recording, and the "Trigger Signal Detection Method" is level, if moved to the next block with the trigger in the continuous input state, the trigger is input immediately to the next block so it may not have the expected result.
- In that case, set the "Trigger Signal Detection Method" to edge.
- Multi-trigger Detection (☒A 9-25)
- Multi-manual Recording (☒A 9-29)

■ ⚙	1	Select the detailed settings tab icon
Signal	2	Select inside the Signal tab box
Detection Method	3	Select the box to the right of Detection Method • A popup window is displayed
	4	Select the desired item in the popup window • Select from "EDGE" or "LEVEL"

7-14   (00XXX)

Select the Polarity for the External Input/Output Signals

■ Set the Trigger Filter

There is a built-in digital noise filter for trigger input with the MEMRECAM ACS-1. If there is noise in the trigger signals, set the filter value larger to activate the filter.
The filter value is the time delay when an exact rectangle pulse with no chattering is input.
Set within a range of 0.0 to 6553.5µsec at units of 0.1µsec.

■ ⚙	1	Select the detailed settings tab icon
Signal	2	Select inside the Signal tab box
Use TRIG1 Filter for TRIG2	3	Select the box to the right of Use TRIG1 Filter for TRIG2 • A popup window is displayed
	4	Select the desired item in the popup window • YES:Applies the TRIG1 filter to the TRIG2 filter • NO:Applies the TRIG2 filter to the TRIG2 filter
TRIG1 Filter (x100ns) TRIG2 Filter (x100ns)	5	Select the desired input/output polarity setting in the box to the right • A keypad is displayed
	6	Input on the keypad in the popup window • The number input x100ns is used as the filter value.
	7	Select OK on the keypad

7-15   (00XXX)

Attention Mark

Attention   It indicates precautions.

CHECK   It indicates matters to be confirmed or to be known.

About the notation in the text

- 📖 Reference page is shown

It means
"to be continued to next page".

Table of Contents

Detailed Settings

System (Utility) Settings

Other

Specification

Index

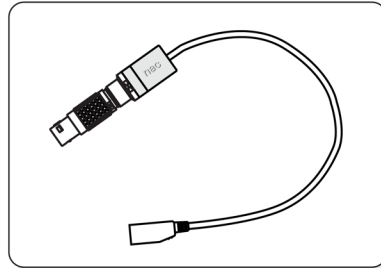# Contacts

1

Introduction

(00457)H

Check the Standard Components

The following are included as standard components of the MEMRECAM ACS-1.
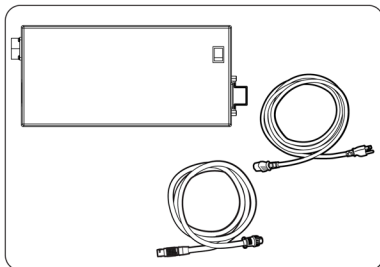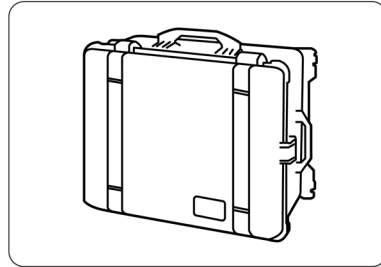
Make sure that all are included.

● MEMRECAM ACS-1 main unit
(Lenses are sold separately)

● Easy J3 cable

● AC POWER SYSTEM


● ACS-1 carrying case

- MEMRECAM ACS-1 main unit :   ACS-1 camera main unit
- Simple J3 cable: Cable connecting to the control PC
- AC POWER SYSTEM: AC adapter for the ACS-1, power cable set
- ACS-1 carrying case: Case that houses the ACS-1 main unit and peripherals,
 for safe transport

⚠ Attention
  •The MEMRECAM ACS-1 has the following model variations.
   Memory: 64 GB / 128 GB / 256 GB
  • Lens mount: F mount/C mount.
  • Check that the purchased model matches the contents.

1-2

- ACS-1 KIT

- ACS-1 MANUAL CD
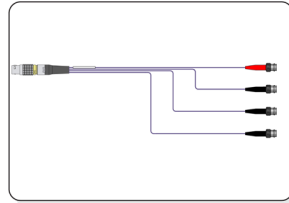 (Electronic manual)
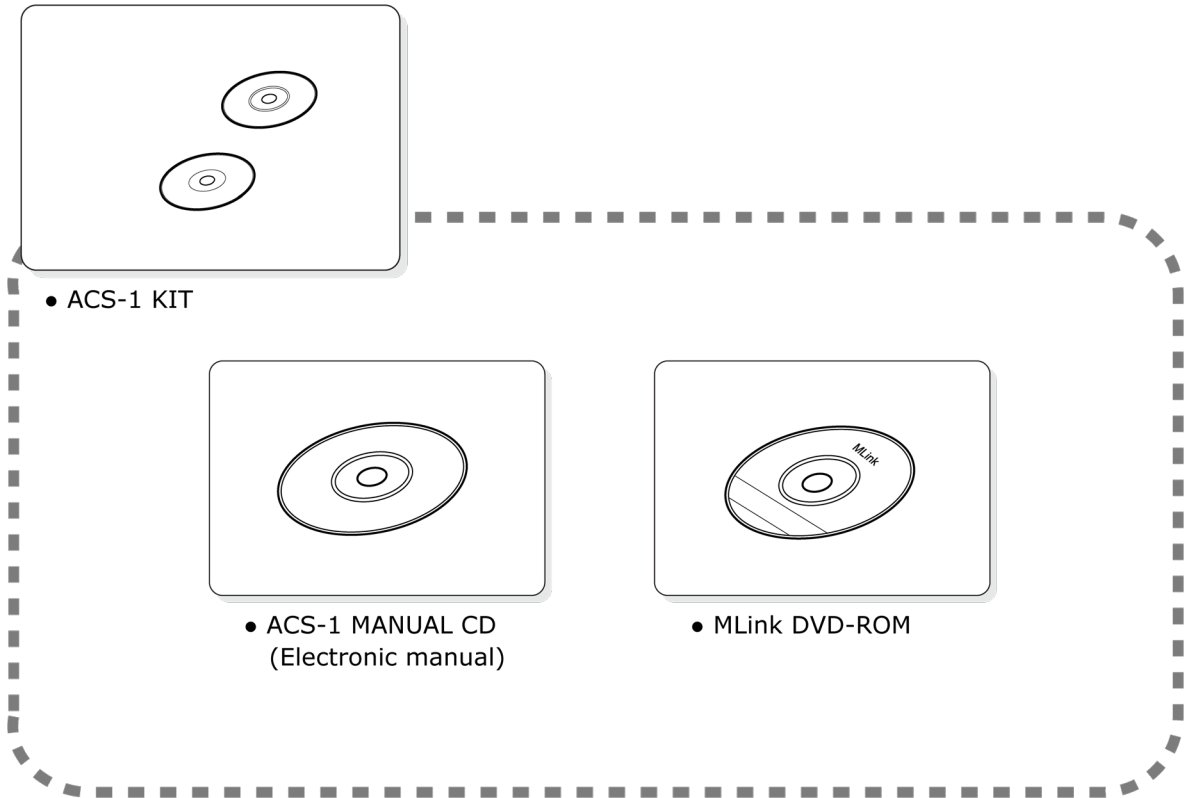
- MLink DVD-ROM

• ACS-1 KIT :　　　　　PC control software for the ACS-1 and the user's guide

    • MLink DVD-ROM:　　　　　　　　　DVD-ROM of the PC control software

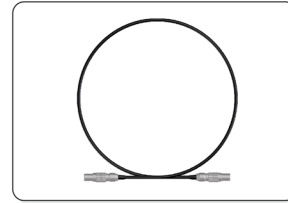   • ACS-1 MANUAL CD:　　　　　　　　Electronic manual of the ACS-1 user's guide

1-3

Options

The following are the MEMRECAM ACS-1 options.
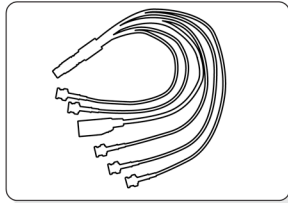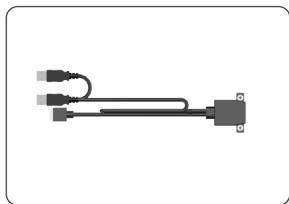
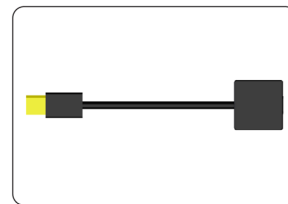|		
• J3 branched cable	• AUX Cabel	• SYNC Cabel
• V-PAD	• V-PAD cable	•DisplayPort-HDMI conversion cable
• V-PAD holder		

• J3 branched cable	Input/output cable common to the ACS series, the HX series, and the GX series
•AUX cable	GENERAL input, GENERAL output 1, GENERAL output 2, GENERAL output 3
•SYNC cable	For ACS-1 SYNC-I , ACS-1 SYNC-O connections
•V-PAD	Wired touch screen to perform the settings and operation of the ACS-1
•V-PAD cable	DOCKPORT cable, video communication power supply cable for the back terminal of the V-PAD
•DisplayPort-HDMI conversion cable	Cable to convert ACS-1 DisplayPort output for V-PAD HDMI input
•V-PAD holder	Set of a plate to secure the V-PAD, a plate tripod conversion tool to secure the V-PAD, a universal head, and a bilateral mini tripod screw specified extender

CHECK •This user's guide is for ACS-1 operation using the V-PAD. Please refer to the MLink user's guide for the operating method using MLink.

Attention •This guide is used for the aforementioned options. Make sure to consider their purchase.
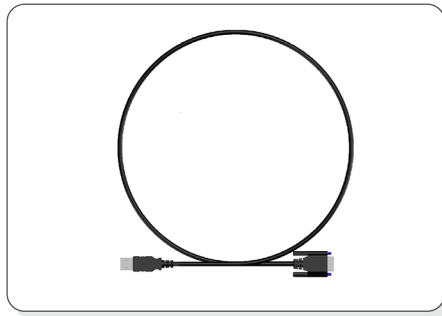
● USB3.0 microB Cable

• USB3.0 Cable :   USB3.0 cable for the A to microB type, screw type

        Manufacturer: 3M

        Model: 1U30A-MB2-SA1-700 (Length: 7m)

                        1U30A-MB2-SA1-600 (Length: 6m)

                        1U30A-MB2-SA1-500 (Length: 5m)

                        1U30A-MB2-SA1-400 (Length: 4m)

                        1U30A-MB2-SA1-300 (Length: 3m)

                        1U30A-MB2-SA1-200 (Length: 2m)

                        1U30A-MB2-SA1-100 (Length: 1m)
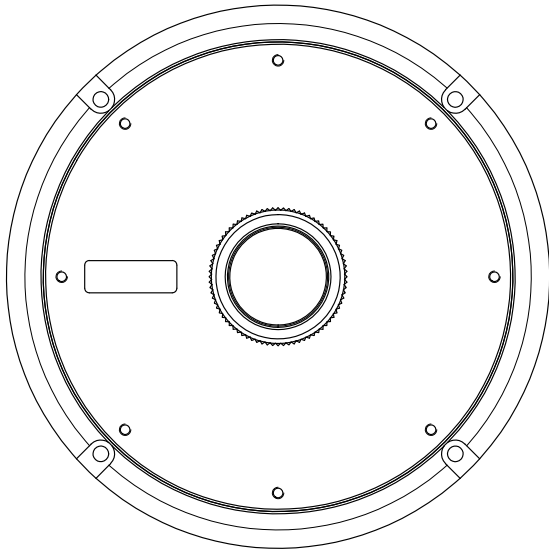
Front
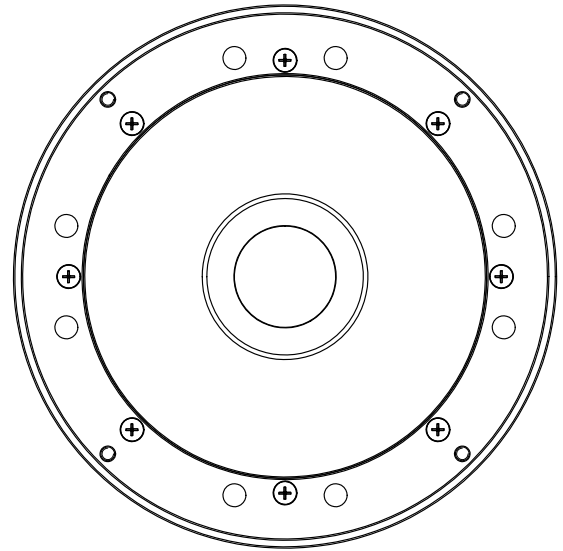
Rear

- C mount adapter   Included with ACS-1

Attention   •Mounting screw depth is within 8mm, vignetting may occur depending on image resolution.

1-6

External Appearance and Names of Each Part

■External Appearance and Names for this Unit

Top, side

Old body
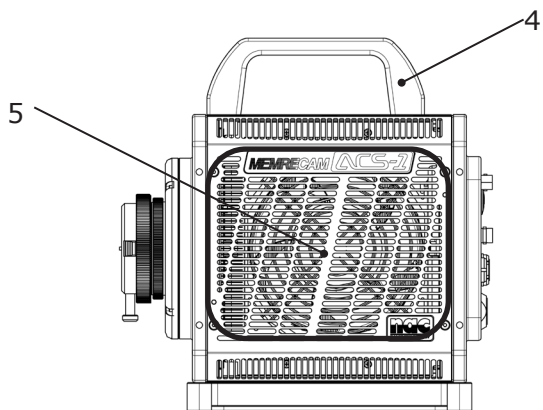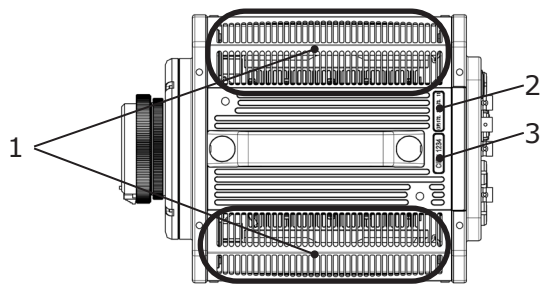
New Body
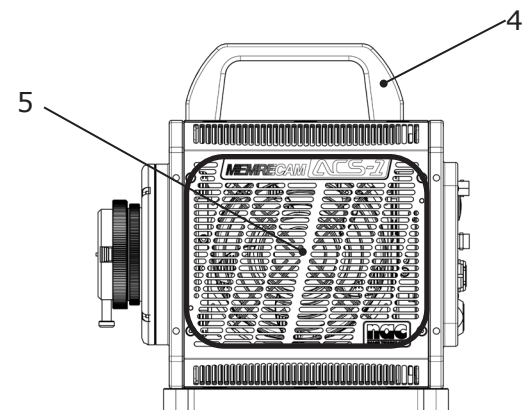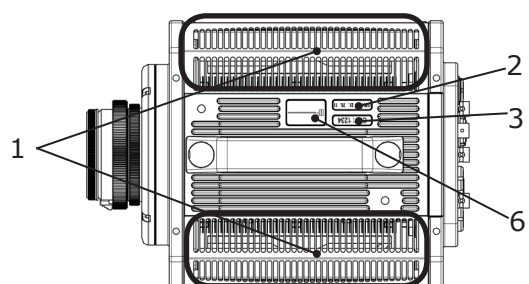
1   Outlet ports ▸▸🕮 2-2

2   Factory IP address (IP address at factory shipment)

3   CID number (Equipment specific number)

4   Handle

5   Intake port ▸▸🕮 2-2

6   IP address writing sticker (Write the set IP address)

1-7

Bottom, side
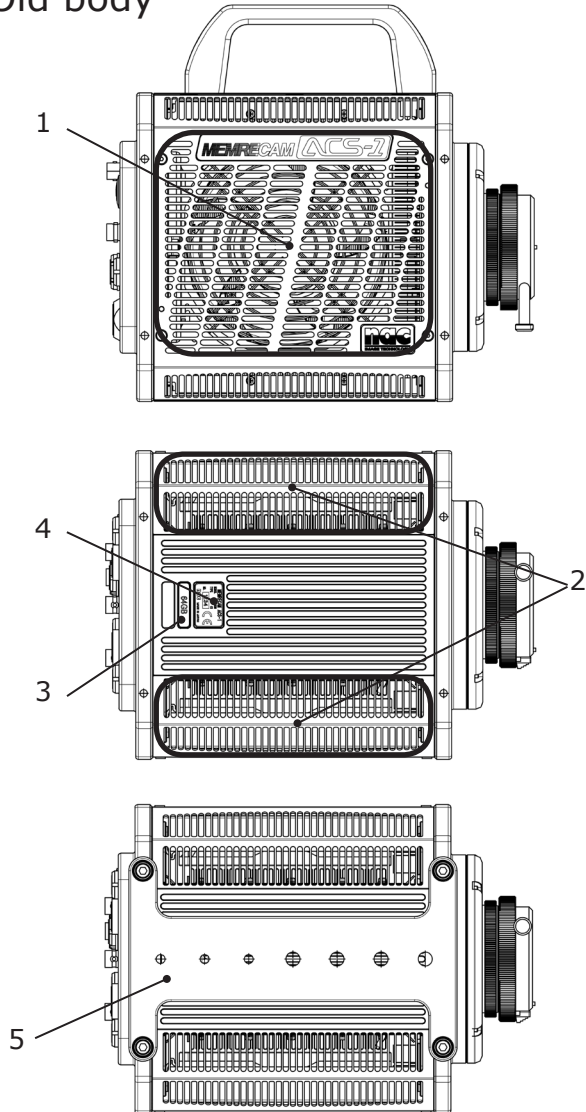
Old body   New Body
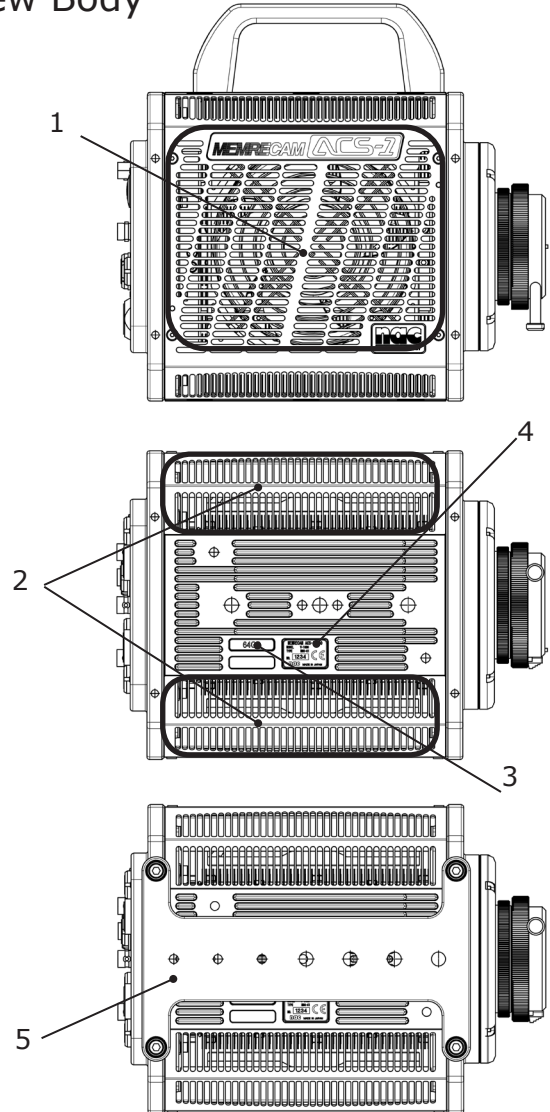
1   Intake ports ▸▸🕮 2-2

2   Outlet ports ▸▸🕮 2-2

3   Memory capacity memory capacity for this unit

4   Product name plate indicates the product number

5   Tripod plate Large tripod screw, small screw plate

1-8

Front, back
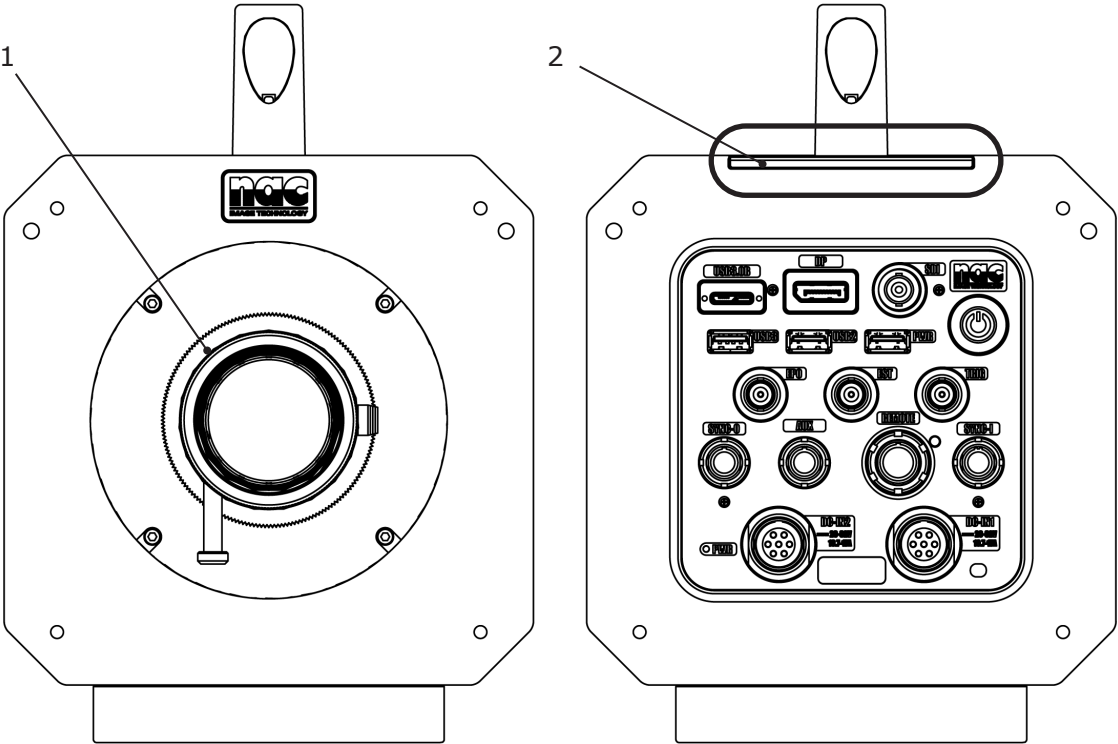
1   Lens mount ⇥📖 2-4

2   Status LED

Rear Panel
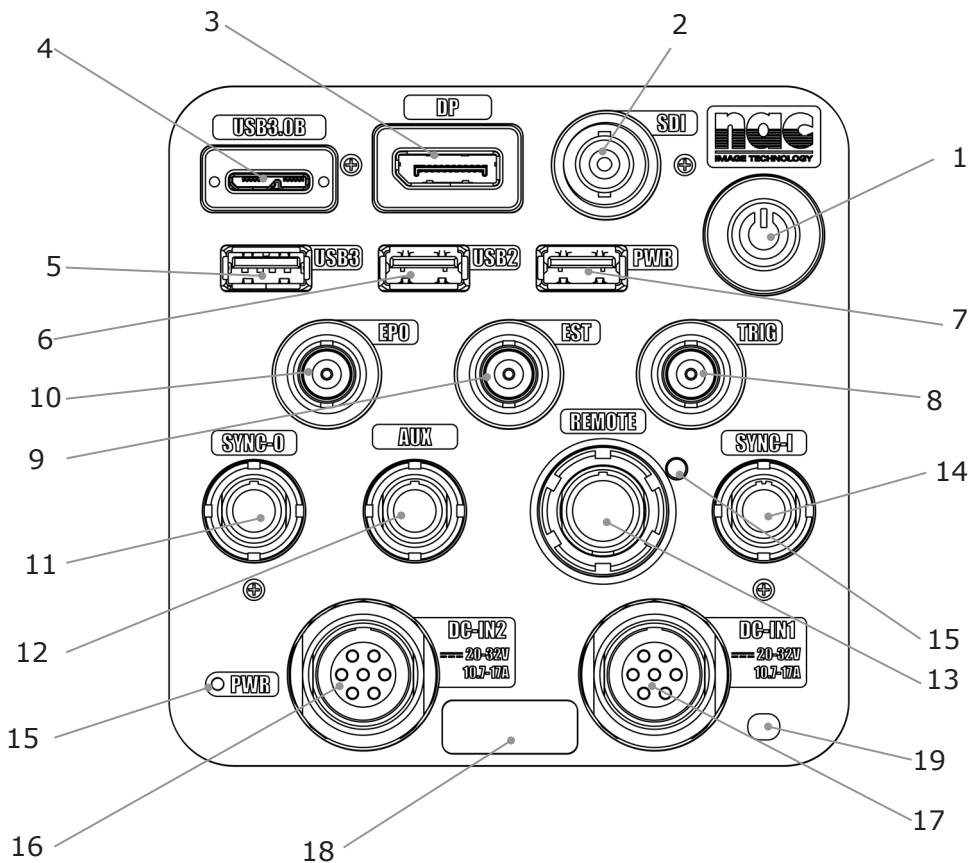
1	Start switch (Lit in green after startup	11	SYNC-O connector 10-69
2	SDI connector 10-65	12	AUX connector 10-56
3	DP (DisplayPort) connector 2-12	13	REMOTE connector 10-58
4	USB3.0B connector 10-64	14	SYNC-I connector 10-67
5	USB3.0 connector 10-64	15	Status LED 10-50
6	USB2.0 connector 10-63	16	DC-IN2 connector 10-55
7	USB PWR output connector 10-63	17	DC-IN1 connector 10-55
8	TRIG connector 10-61	18	Windows license seal
9	EST connector 10-61	19	Color camera seal (only applied to color cameras)
10	EPO connector 10-62		

Status LED
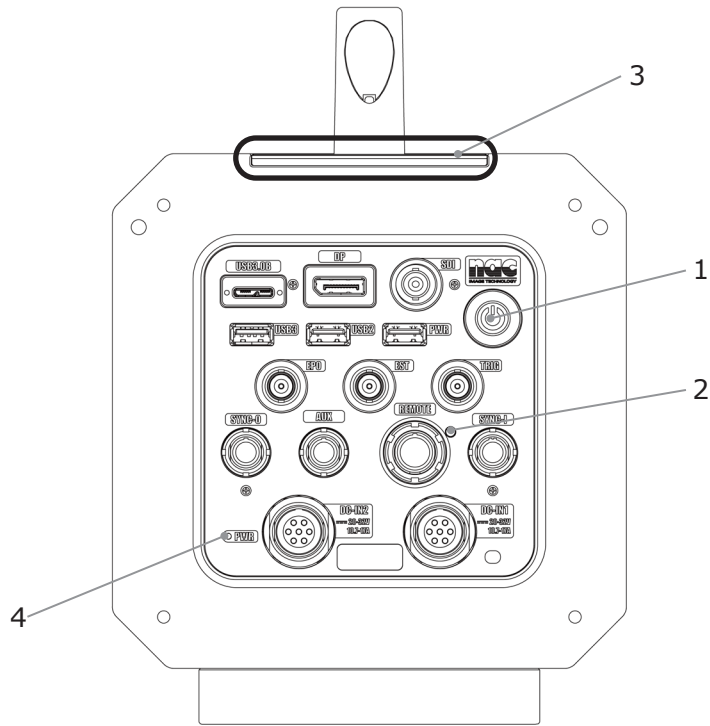
1   POWER SW LED

2   ETHERNET LED

3   CAM MODE LED

4   PWR LED

LED	LED status	Operation
POWER SW	Green	Camera power ON
	Off	Camera power OFF
ETHERNET	Yellow green	1000BASE-T network
	Orange	100BASE-TX network
	Off	No network connection Or the power is OFF.
CAM MODE	Orange	REC mode (camera image output, recording in the camera image memory after trigger detection)
	Blue	STOP/READY mode (Memory image output. Play mode or transfer mode after startup)
	White	VIEW mode (camera image output, recorded memory details are saved)
	Magenta	ARM mode (camera image output, recorded memory details are deleted and the camera image is recorded in the memory)
	Off	Power OFF or starting up
	Blinking	Set in EST mode and the EST pulse is input. But only with the VIEW, ARM, REC modes.
PWR	Green	Normal
	Red	Failure
	Red (Blinking)	Starting up / Shutting down
	Orange	Camera power is OFF with the power switch while normal voltage is being supplied by the external power source
	Orange(Blinking)	Camera power is OFF with the power switch while abnormal voltage is being supplied by the external power source
	Alternating green and red (Blinking)	Thermal shutdown implemented
	OFF	Power OFF (No external power source)

■AC POWER SYSTEM
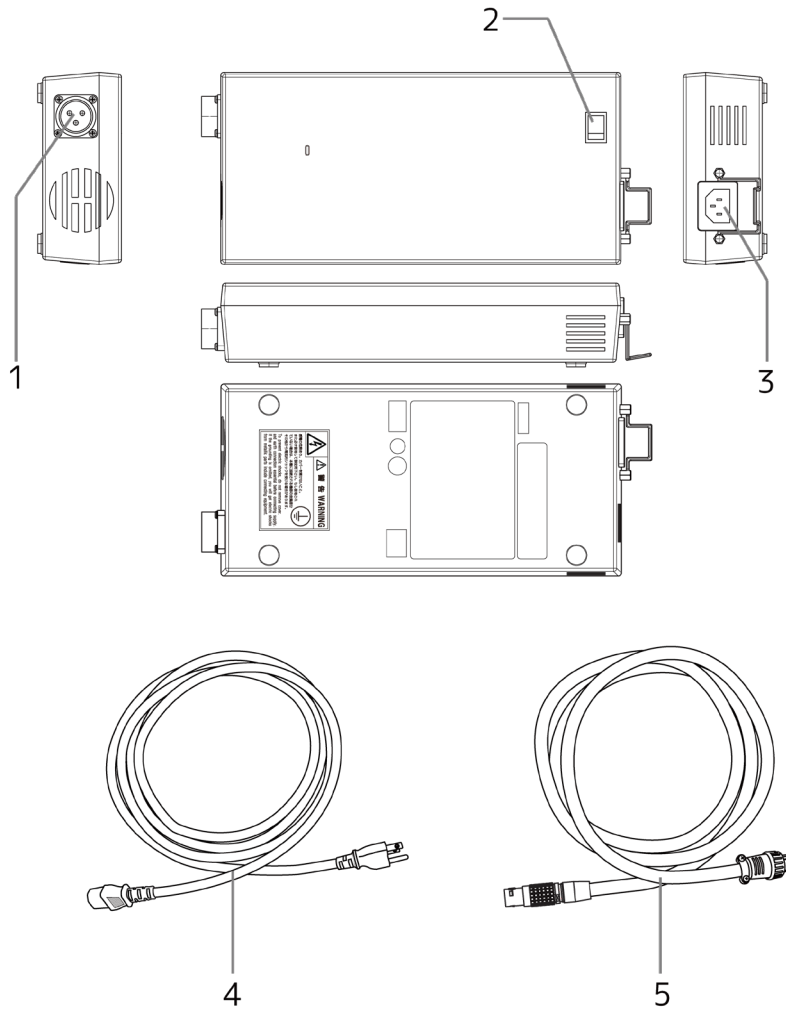
1   DC connector ▶▥ 2-9

2   Power switch ▶▥ 2-16

3   AC connector ▶▥ 2-9

4   AC cable ▶▥ 2-9

5   DC cable ▶▥ 2-9

■External Appearance and Names for the Viewfinder (V-PAD)
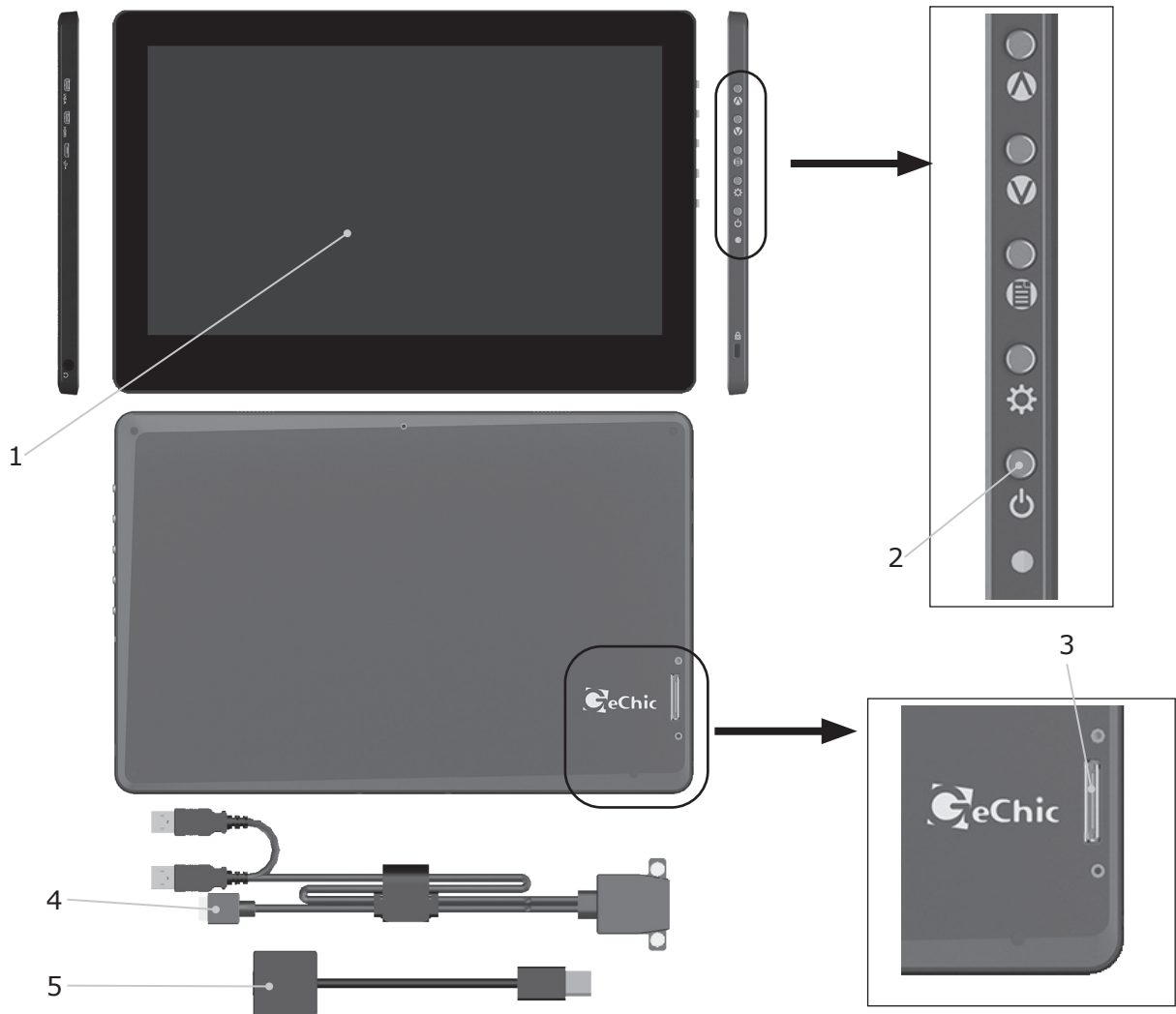
1   LED panel 📖 3-2

2   Power switch 📖 2-9

3   Connector cable for the back ⇥📖 2-10

4   Back cable (DOCK PORT CABLE) ⇥📖 2-10

5   DisplayPort HDMI conversion cable ⇥📖 2-10

⊘Attention   •Details for each component of the V-PAD can be found in the attached user's guide.

Operation Flow

• V-PAD operation

• Operation using the Windows control software MLink

• Operation using external input/output signals

• Pilot using sequence files input to a USB storage device

This manual describes the method of operation using the dedicated remote control V-PAD.

The flow for basic recording, playback and storage on this device is shown in the following figure.

Preparations ▸▸🕮 2-1
· Install and attach the lens.
· Connect the V-PAD and power supply to the camera.
· Turn on the power.

▼

STOP ■ ▸▸🕮 3-22
· Start the ACS-1.
· Perform recording and system settings.

◀▶

Recording Settings ■◉ ▸▸🕮 4-1
· Setting of shooting mode, recording method, memory division, input / output signal, synchronization signal, synchronization time.

Setting details ■⚙ ▸▸🕮 7-1
· Setting of date time, information display etc.

▼

VIEW ▶ ▸▸🕮 3-23
· While checking the live image of the camera, adjust the focus, angle of view, subject etc., and set the recording.

◀▶

Recording Settings ■◉ ▸▸🕮 4-1
· Setting of recording speed, frame size, shutter, exposure time, etc.

▼

ARM/REC ⏺ ⚡ ▸▸🕮 3-25
· Recording is started and recording is terminated by input of trigger according to the phenomenon to be recorded.

▼

STOP ■ ▸▸🕮 3-22
· Configure playback and saving of recorded images.

◀▶

Playback settings ■▶ ▸▸🕮 5-1
· Image quality adjustment, zoom, scroll and other settings.

Save settings ■⬇ ▸▸🕮 6-1
· Setting of storage range, storage format, etc.

▼

PLAY ▶ ▸▸🕮 3-28
· Play recorded images.

▼

Download ▸▸🕮 3-32
· Save the recorded image to USB storage etc.

⟳ **Attention** •Read the "MLink User's Guide" for operation using the MLink control software and operation using the auto pilot.

2

Preparations

Set Up Main Unit

Place MEMRECAM ACS-1 main unit on a level surface or tripod for use.

■Place on a level surface

Place this device on a stable table or desk.
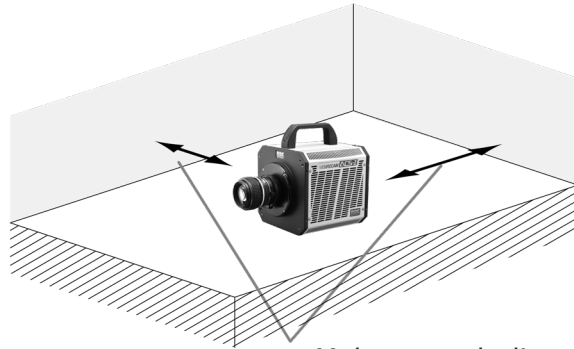
Make enough distance from the wall etc

⊘Attention
- There are air inlets and exhaust vents on this device for cooling, and ventilation occurs with a fan.
- Install with adequate distance from walls and such so ventilation is not obstructed. Install in a well ventilated location if possible.
- Do not block the air inlets or exhaust vents with objects or cloth.

(00457)H

■Mounting This Unit on a Tripod

The Old type tripod can be mounted to the tripod plate using the diameter 3/8-16UNC mounting screws (large tripod screws) with lengths of less than 18mm (4) and the diameter ¼-20UNC (small tripod screws) with lengths of less than 18mm (3, used for purposes other than supporting the weight of this unit).

The New type tripod can be mounted to the tripod plate using the diameter 3/8-16UNC mounting screws (large tripod screws) with lengths of less than 14mm (4) and the diameter ¼-20UNC (small tripod screws) with lengths of less than 14mm (3, used for purposes other than supporting the weight of this unit).

The relationship of the positions of the large and small screws can be changed by switching the front/back locations of the plate.

ACS-1 Old body and Old type Tripod

3/8-16UNC Depth18   1/4-20UNC Depth18
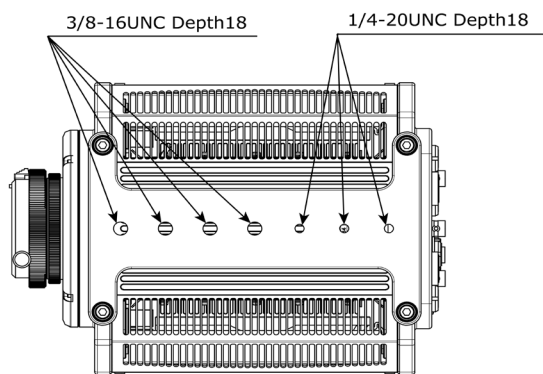
ACS-1 New body and New type Tripod

3/8-16UNC Depth14   1/4-20UNC Depth14   1/4-20UNC Depth 7.5

3/8-16UNC Depth 7.5
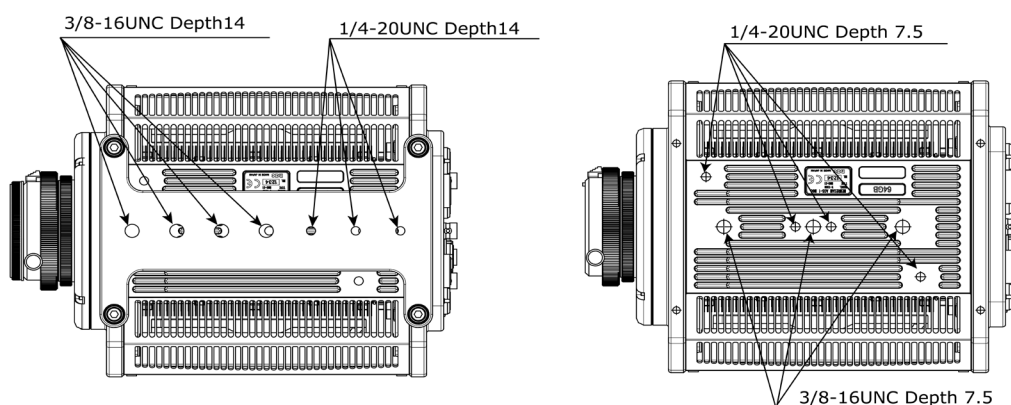
Attention
- •The weight of this unit alone is about 7.3kg (not including the handle or lens mount). Use a tripod that properly corresponds to the weight that includes the lens, cables and such.
- •Contact your retail outlet to purchase the corresponding tripod.

2-3

Mount the Lens

The mount adapter is secured with 4 screws to the front panel of the MEMRECAM ACS-1. The two types of mount adapters are the F mount and the C mount. This describes how to mount the lens, using the F mount as the example.
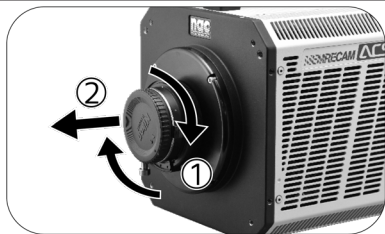
A Nikon F mount lens can be mounted to the F mount adapter ACS-1.

■ Mount the Lens

1   Remove the cap
- Remove the ACS-1 mount cap and lens cover.

Align mark

2   Mount the lens
- Mount the lens
- Align the screw part on the lens with the screw part on the mount (1) and turn the lens until it stops (2).

3   The lens focus mode will be "MF"
- The ACS-1 F mount is not compatible with the auto focus function.

Attention
- The lenses are sold separately.
- Refer to the user's guide for lens for the proper handling of the lens.

■ Remove the Lens

1   Remove the lens
- Press the mount adapter lens removal button (1) while turning in the direction of the arrow (2).

Attention
- Make sure to install the mount cap when detaching the lens from the MEMRECAM ACS-1. Additionally, make sure that dirt or contamination do not get inside the mount.
- Vignetting may occur on some lenses due to the image resolution. (For example, the Nikon DX Nikkor lens)

Adjust the Lens Aperture

This describes the way to adjust the lens aperture of the F mount lens. Aperture adjustment is possible using the ring on the ACS-1 even with a lens that does not have an aperture ring.

There is a mount aperture ring on the F mount adapter of the MEMRECAM ACS-1.
It is possible to adjust the aperture even on a lens that does not have an aperture ring by using the mount aperture ring on the main unit of the camera.

■Adjust the Aperture

The method for adjusting the aperture differs on lenses without an aperture ring.

If the lens has an aperture ring

Example:
SIGMA ASPHERICAL 24mm 1:1.8D
EX DG MACRO

Adjust the aperture with the lens aperture ring
• Turn the mount aperture ring in the direction of CLOSE until it stops.This cancels the mount aperture ring function.
• Next, turn the aperture ring on the lens to adjust the aperture.

⚠ Attention
• If using a lens with an aperture ring and the mount aperture ring isn't turned in the CLOSE direction, stopping down will not occur properly even if the aperture is adjusted with the lens aperture ring.

2-5

If the lens does not have an aperture ring

Example:
Nikon ED AF-S NIKKOR 70-300mm
1:4.5.6G

Adjust the aperture with the mount aperture ring
•Turn the mount aperture ring to adjust the aperture. If you turn it in the CLOSE direct, the aperture will close.
　　•The image will get darker
　　•The depth of field will get deeper (the range of focus will be wider)
•If turned in the OPEN direction, the aperture will open.
　　• image will get brighter
　　•The depth of field will get shallower (the range of focus will be narrower)

Since the mount aperture ring indicator mark (●) is a target, adjust while checking the actual image.

Connect the Equipment and Cables

This describes the connections for peripherals for recording, including the power, V-PAD and monitor, as well as the cables.
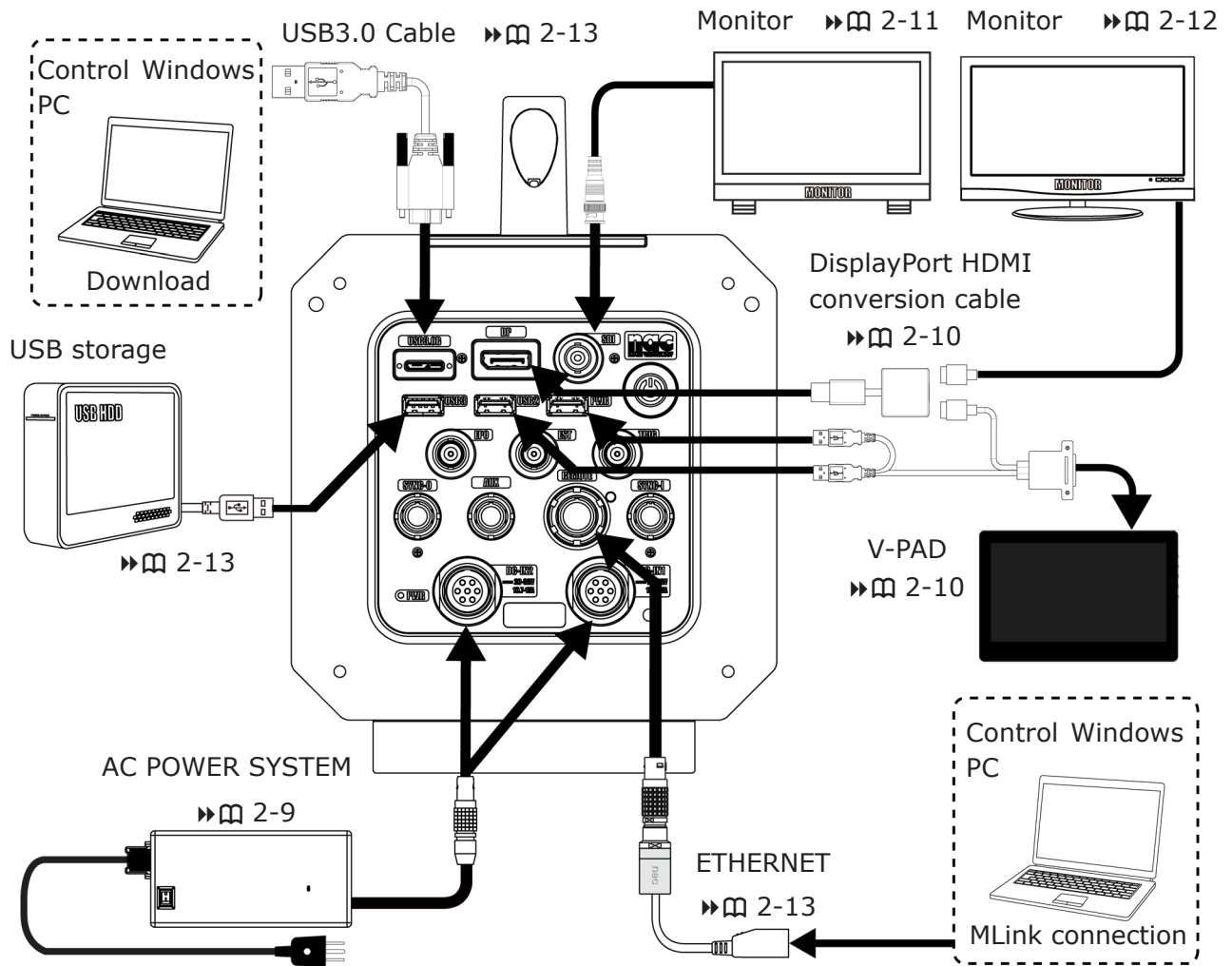
■ Input/Output Connectors

Connector	Branched Connector	Input / Output Signal
SDI	—	3G-SDI Level A signal output
DP	—	DisplayPort signal output
TRIG	—	External trigger input (TRIG1)
EST	—	Exposure start signal input (EST1)
EPO	—	Exposure pulse output (EPO)
AUX	GENERAL IN (Note 1)	Selected signal input
	GENERAL OUT1 (Note 1)	Selected signal output 1
	GENERAL OUT2 (Note 1)	Selected signal output 2
	GENERAL OUT3 (Note 1)	Selected signal output 3
REMOTE	ETHERNET	100/1000BASE-T Ethernet
	TRIG2 (Note 2)	External trigger input (TRIG2)
	EST2 (Note 2)	Exposure start signal input / event input (EST2)
	IRIG-B (Note 2)	IRIG-B time code input
	EPO (Note 2)	Exposure pulse output (EPO)
	PWRCNT (Note 2)	Power control signal input
SYNC-I (Note 3)	—	Synchronizing signal input
SYNC-O (Note 3)	—	Synchronizing signal output
DC-IN1	—	Power input 1
DC-IN2	—	Power input 2
USB3.0B	—	USB3.0 download
USB3.0	—	USB3.0/USB2.0 compatible device connection
USB2.0	—	USB2.0 compatible device connection
PWR	—	USB device power

Note 1   An ACS AUX cable (option) is required.

Note 2   A J3 cable (option) is required.

Note 3   An ACS SYNC cable (option) is required.

(00457)H

■Input/Output Connectors

USB3.0 Cable ▸▢ 2-13

Control Windows PC

Download

USB storage

▸▢ 2-13

Monitor ▸▢ 2-11   Monitor ▸▢ 2-12

DisplayPort HDMI conversion cable
▸▢ 2-10

V-PAD
▸▢ 2-10

Control Windows PC

MLink connection

AC POWER SYSTEM

▸▢ 2-9

ETHERNET
▸▢ 2-13

⊘ Attention •The V-PAD, DOCKPORT cable and DisplayPort-HDMI conversion cable are sold separately.

2-8

(00457)H

Preparations

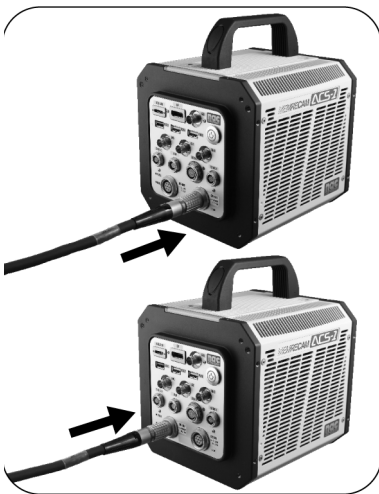# ■Connect the Power

Connect the AC POWER SYSTEM.

1	Turn the power switch OFF
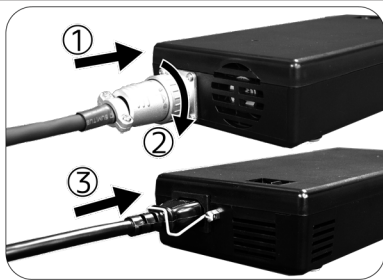
2	Connect the cable to the AC adapter •Line up the DC OUT connector with the bumps on the DC cable shell and insert (1). •Turn the cable plug shell in the direction of the arrow (2) to lock the cable. •Plug the AC cable into the AC IN connector (3).

3	Connect the AC cable to the power outlet

| 4	Connect the DC cable to ACS-1. •Line up the red arrow of the DC cable plug with the DC IN connector on the ACS-1 rear panel and plug in until it clicks. •When unplugging the DC cable from the ACS-1, hold the shell of the plug and pull straight out. •Check the input status of the external power with the rear panel PWR LED. (➥ 📖 3-5) •DC-IN1 and DC-IN2 (even for the connection relationship on the power supply circuit) have the same functions.

🚫Attention •Make sure to turn off the power to the AC adapter when unplugging the DC and AC cables.
•Do not open the AC adapter cover. Areas generating high voltage are dangerous.
•Make sure the connection is grounded. Electric shock may occur if not grounded.
•When plugging in using a 3P-2P conversion plug, connect the grounding wire for the conversion plug to an external grounding source.
•This is an AC adapter dedicated for the MEMRECAM ACS-1 so do not use on other devices.

2-9

■ Connect the V-PAD

Connect the V-PAD (sold separately).
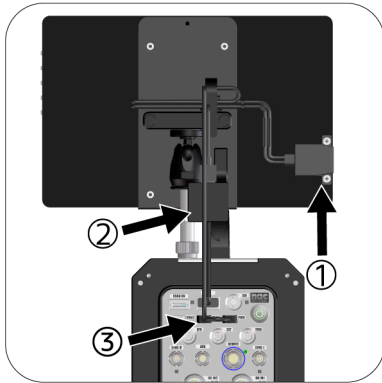
1 Connect the cables
- •Connect the DOCKPORT cable to the V-PAD (1).
- •Next, connect the DisplayPort-HDMI conversion cable (2) to the DOCKPORT cable HDMI terminal.
- •Next, connect the DisplayPort-HDMI conversion cable and the USB cables to the ACS-1 main unit (3).
- •Of the USB cables, connect the main cable (4) to USB2 and the auxiliary power cable (5) to PWR.

USB3.0B	compatible with USB microB standards
USB3	compatible with USB3.0/2.0 standards
USB2	compatible with USB2.0 standards (for V-PAD signal cable)
PWR	for the power supply (for V-PAD auxiliary power)

2-10

Preparations

■Connect the Monitor (3G-SDI)

Connect the 3G-SDI compatible monitor

Usable Monitor Specifications

Connector	BNC Terminal
Monitor signals	3G-SDI Level A

1 Connect the monitor cable
•Connect the 3G-SDI cable to the SDI terminal on the rear panel.

2-11

(00457)H

■ Connect the Monitor (DisplayPort)

Usable Monitor Specifications

Connector	DisplayPort Terminal
Monitor signals	DisplayPort
Scan frequency	60 to 85Hz
Usable screen resolution	640 × 480
	800 × 600
	1024 × 768
	1280 × 1024
	1920 × 1080 (recommended resolution)

Recommended monitor (Panel resolution 1920 × 1080) LCD monitor

⊘ Attention
- Monitors with resolutions other than those listed above and monitors with resolution of 1920 × 1080 or lower can be used as support resolutions but formal support and operating checks cannot be performed.
- There are some resolutions that cannot be set on some monitors. (Example: A resolution setting of 1920 x 1080 cannot be set on some monitors with panel resolutions of 1920 × 1200)

---

1 Connect the monitor cable
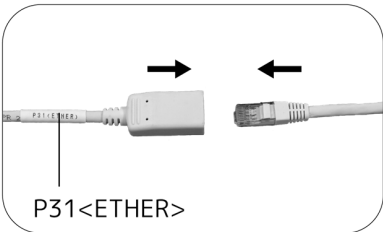- Connect the DisplayPort cable to the rear panel DisplayPort terminal.

■Connect a Control Windows PC

Connect using an Ethernet when using a PC.

When performing a high speed download to a PC, connect with a USB3.0 cable.

1 Connect the simple J3 cable to the REMOTE connector
•Connect the simple J3 cable or J3 branched cable (sold separately) to the REMOTE connector.

P31<ETHER>

2 Connect the Ethernet connector for the simple J3 cable and the Windows PC with the Ethernet cable
•Connect the Ethernet cable to the Ethernet (RJ45) connector for the simple J3 cable
•Connect the other Ethernet cable to the Windows PC.
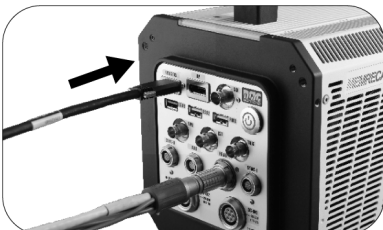
3 Connect the USB3.0 cable to the USB3.0B connector
•Connect the USB3.0 cable (sold separately) to the USB3.0B connector on the rear panel.
•Connect the other USB3.0 cable to the PC

Attention •Connect the USB3.0 cable to a USB3.0 compatible connector for your PC.
•The USB3.0 is only for downloading. Use the Ethernet for camera operations on your PC.

CHECK •Refer to the "MLink User's Guide" for the download operations using the USB3.0.

2-13

Mount the C Mount Adapter
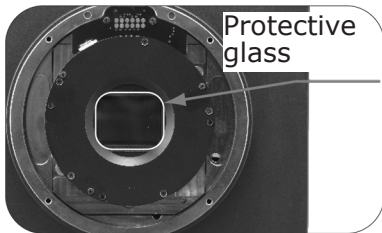
(00457)H

Attention •A lens mount adapter such as the C mount adapter is adjusted to each camera. It cannot be mounted on other cameras.

**1** Turn OFF the ACS-1 and the AC adapter.

2 Remove the fixing screws on the lens mount mounted on the ACS-1.
•Do not lose the screws.

3 Remove the lens mount mounted on the ACS-1.

Protective glass

Attention •There is protective glass in place when the mount adapter is removed but it's surface should not be touched. If dirt adheres to it, the image quality may be sacrificed.
•The protective glass can be easily damaged. If soiled with oil or such, please take to the retail outlet for cleaning.
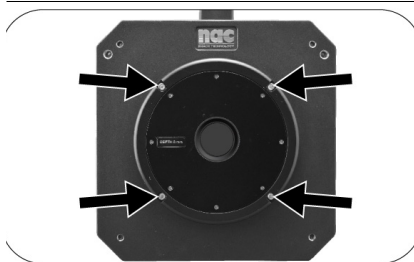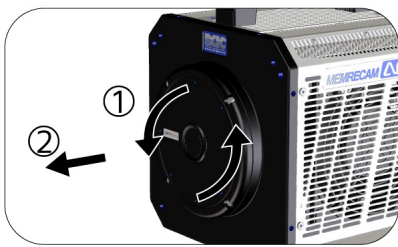
4 Use the screws removed in 2 to secure the C mount adapter.

The C mount lens can be mounted on the C mount adapter.

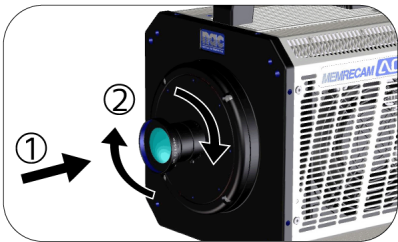*Attention* •CS lenses cannot be used.

(00457)H

■Mount the C Mount Lens

1 Remove the cap
- Turn the ACS-1 mount adapter cap in the direction of the arrows to remove (1) remove (2).
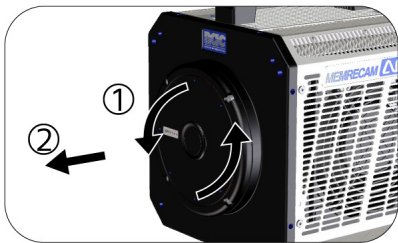Remove the lens cover.

2 Mount the lens
- Line up the lens with the mount adapter screw (1) and turn the lens in the direction of the arrows until it stops (2).

■Remove the C Mount Lens

1 Remove the lens
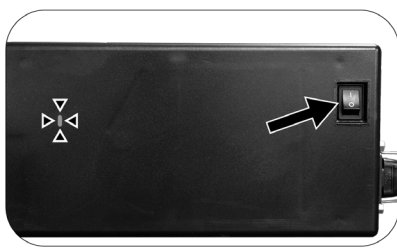- Turn the lens in the direction of the arrows (1) remove(2).

Attention •If there is no lens mounted on the MEMRECAM ACS-1, make sure to put a mount cap on. Also, use caution to prevent dirt and contamination from getting into the mount.
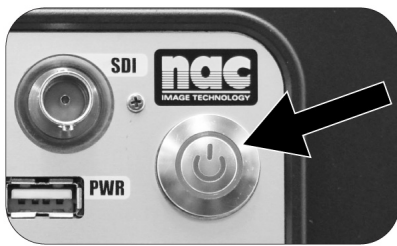
Turn ON / OFF the Power

■ Start up the ACS-1
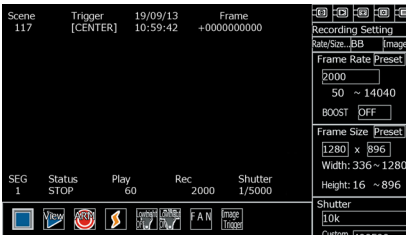
1   Turn ON the power switch of the AC adapter
- Turn the switch ON after confirming that the AC cable and the DC cables are connected to the AC adapter and ACS-1. (▸▯ 2-9)
- The LED on the power switch of the AC adapter will be lit.
- The rear panel PWR LED will be lit in orange.

2   Turn ON the power switch on the ACS-1
- Press the power switch on the ACS-1 for at least 2 seconds.

3   Startup of the ACS-1 will begin and a self-diagnosis will be performed
- When the V-PAD is connected, the initial screen will be displayed on the V-PAD.

- Once the self-diagnosis is complete, the startup will be complete and it will switch to the STOP mode.

CHECK   •The ACS-1 power can be remotely controlled using PWRCNT (power control) signals. (▸▯ 9-57)

■Status LED during Startup
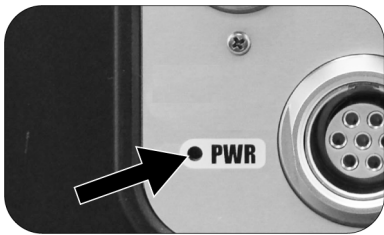
The status LED PWR will blink red from when the ACS-1 power was turned ON until the self-diagnosis has completed.
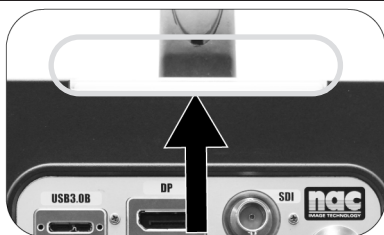
After startup begins   Switch: Lit green
PWR :   Blinking red

Once the startup is done after the self-diagnosis is complete, the status LED PWR will be lit green and the CAM MODE will be lit blue.

Startup complete   CAM MODE: Lit blue
PWR: Lit green

2-17
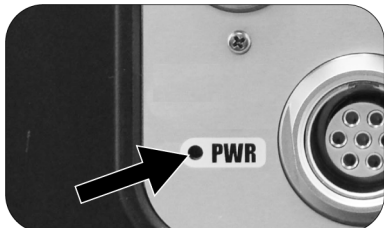
■Turn Off the ACS-1 Power

1 Disconnect the MLink and ACS-1
   • Make sure to save the recorded images before disconnecting.
   • If using a Windows PC, disconnect the MLink and ACS-1.

2 Turn OFF the ACS-1 power switch
   • Press the ACS-1 power switch for at least 2 seconds.
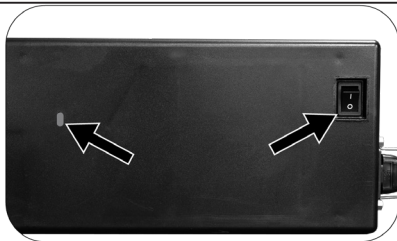
3 Turn OFF the AC adapter power switch after the camera shuts down.

Attention • Before turning off the power, make sure to save any recorded images needed on a USB storage media or the control PC. Check the "MLink User's Guide" for the control PC storage method.
• Save on a USB storage media. (▸▯ 3-31)

Synchronize multiple ACS-1 cameras

ACS-1 is to use the ACS SYNC cable, it is possible to perform a simple synchronous imaging.

⊘Attention •Be sure to turn off the power of the camera before connecting or disconnecting the ACS SYNC cable, as this may cause component failure inside the camera.

SLAVE
MEMRECAM ACS-1

MASTER
MEMRECAM ACS-1

SYNC
(External synchronization input)

SYNC-I   SYNC-O

TRIG IN

(A)

(B)   (B)

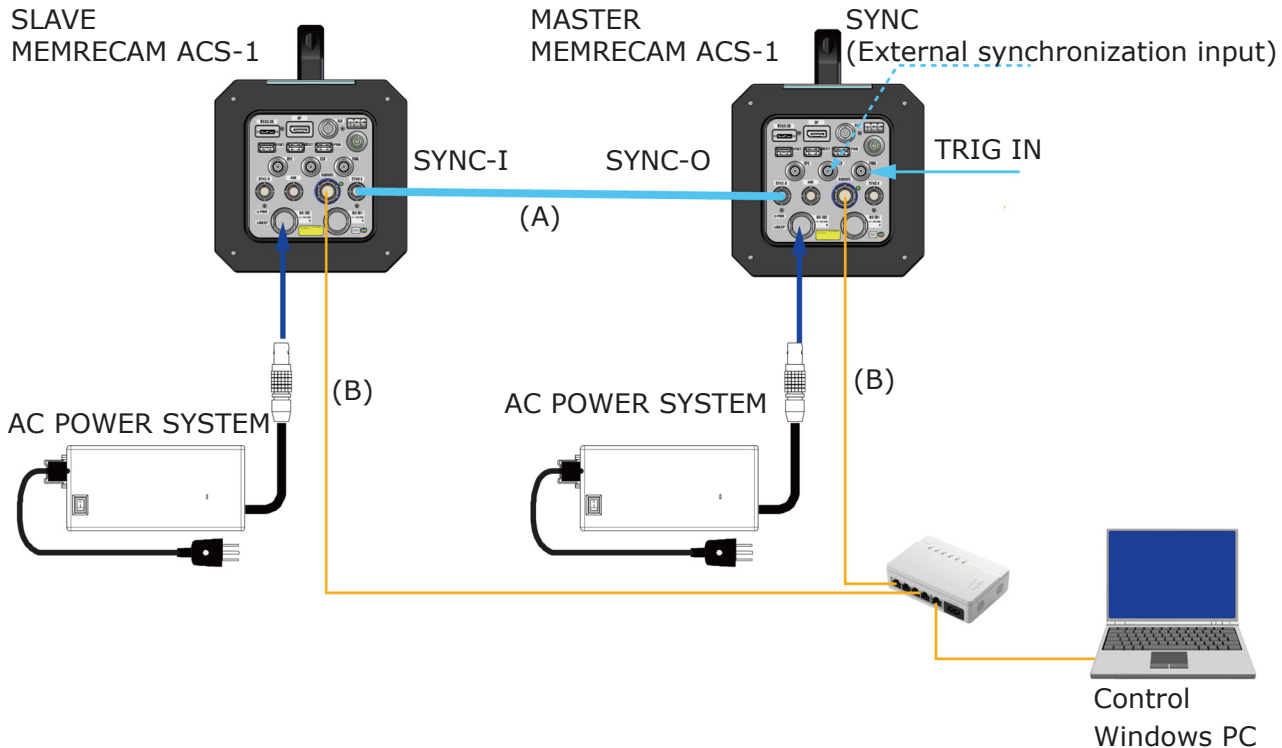AC POWER SYSTEM   AC POWER SYSTEM

Control
Windows PC

Note)
(A) Connect with ACS SYNC cable
(B) Connect with J3 branch cable or simple J3 cable

⌄CHECK✰ •For ACS SYNC cable, EST signal, TRIG signal, IRIG signal can be input and output.

⊘Attention •It is a function dedicated to ACS series. When connecting the MEMRECAM HX series and GX series, options such as GX - HUB are required.

Synchronous shooting is possible by setting the synchronization setting and the trigger input / output setting of the master camera and the slave camera respectively.

■When two ACS-1 cameras are used

In addition to external trigger, synchronous shooting is possible by trigger input with the trigger command (MLink / V-PAD).
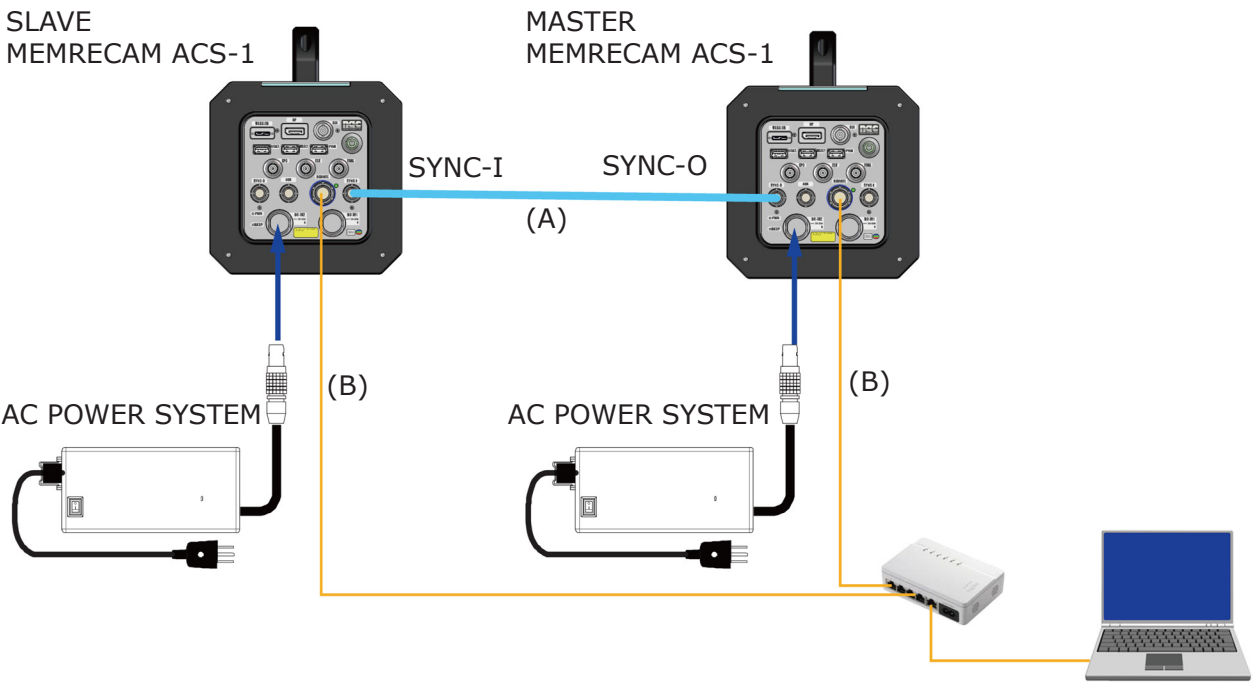Set the TRIG output mode to TRIGOUT for the master camera and STATUS for the slave camera.
For TRIGOUT Timing of the master camera, CENTER is recommended.

Attention
•If the master camera's TRIG output timing is THROUGH or DELAY, the trigger frames of the master camera and the slave camera may be misaligned.
•Be sure to set the trigger selection of the slave camera to TRIG1.

When external sync and external trigger are unnecessary

• Set the Trigger Output Mode to TRIGOUT for the master camera and STATUS for the slave camera.

• For TRIGOUT Timing of the master camera, CENTER is recommended.

SLAVE
MEMRECAM ACS-1

MASTER
MEMRECAM ACS-1

SYNC-I　　　　　SYNC-O

(A)

(B)　　　　　　　　　　(B)

AC POWER SYSTEM　　　　AC POWER SYSTEM

Note)

(A) Connect with ACS SYNC cable

(B) Connect with J3 branch cable or simple J3 cable

	ACS-1	
	MASTER	SLAVE
ACS SYNC cable connection destination	SYNC-O	SYNC-I
Frame Synchronization	Internal Sync	IRIG sync
Trigger input destination	Trigger command(MLink/V-PAD)	SYNC-I
Trigger Selection	TRIG1	TRIG1
TRIG Input	Nega	Nega
Trigger Output Mode	TRIGOUT	STATUS
Trigger Output	Nega	Nega
TRIG OUT Timing	CENTER	CENTER

2-21

When external trigger is required

- Connect the master camera and the slave camera with the ACS SYNC cable.
- Input the external trigger signal to the TRIG connector (TRIG1) of the master camera or TRIG2 of REMOTE.
- Set the master camera's trigger selection to the same as the input destination.

SLAVE
MEMRECAM ACS-1

MASTER
MEMRECAM ACS-1

SYNC-I   SYNC-O   TRIG IN

(A)

(B)   (B)

AC POWER SYSTEM   AC POWER SYSTEM

Control
Windows PC

(A) Connect with ACS SYNC cable
(B) Connect with J3 branch cable or simple J3 cable

	ACS-1	
	MASTER	SLAVE
ACS SYNC cable connection destination	SYNC-O	SYNC-I
Frame Synchronization	Internal Sync	IRIG sync
Trigger input destination	TRIG1 / TRIG2	SYNC-I
Trigger Selection	TRIG1 / TRIG2	TRIG1
TRIG Input	Nega	Nega
Trigger Output Mode	TRIGOUT	STATUS
Trigger Output	Nega	Nega
TRIG OUT Timing	CENTER	CENTER

2-22

When external synchronization is required

• Connect the master camera and the slave camera with the ACS SYNC cable.

• Input the external synchronization signal to the EST connector of the master camera.

• Set Frame Synchronization to EST sync for both master camera and slave camera.

• By selecting the IRIG / M-HUB time for the camera time reference of the slave camera, it is possible to synchronize the time of the master camera and the time of the slave camera.
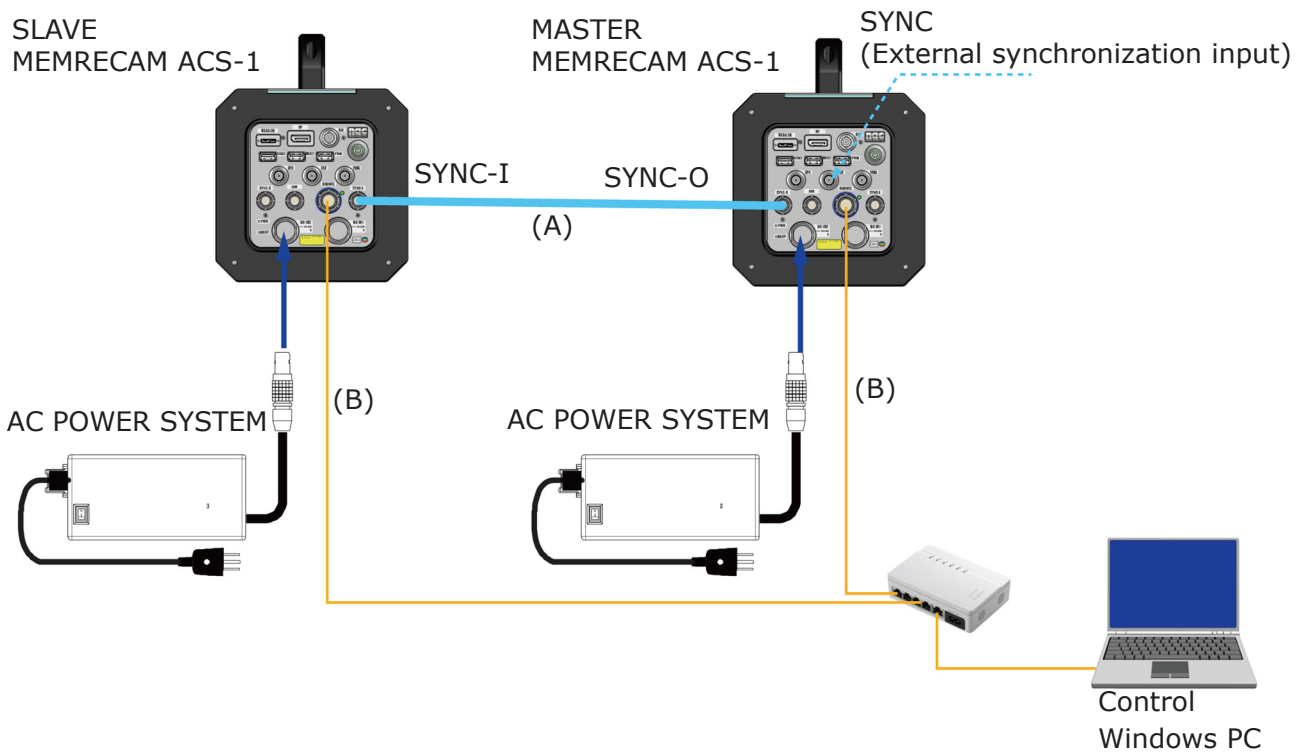
Note)
(A) Connect with ACS SYNC cable
(B) Connect with J3 branch cable or simple J3 cable

2-24

	ACS-1	
	MASTER	SLAVE
ACS SYNC cable connection destination	SYNC-O	SYNC-I
Frame Synchronization	EST synchronization	EST synchronization
Camera Time	Internal Camera Time	IRIG/M-HUB Time
Trigger input destination	Trigger command(MLink/V-PAD)	SYNC-I
Trigger Selection	TRIG1	TRIG1
TRIG Input	Nega	Nega
Trigger Output Mode	TRIGOUT	STATUS
Trigger Output	Nega	Nega
TRIG OUT Timing	CENTER	CENTER

■When there are three or more ACS-1s

•External trigger is required.
•Set TRIG Output Mode to TRIGOUT for both master camera and slave camera.
•For TRIG OUTPUT Timing of the master camera, CENTER is recommended.

Attention
• When the TRIGOUT Timing of the master camera is THROUGH, DELAY, the trigger frames of the master camera and the slave camera may be misaligned.
• Be sure to set the TRIGOUT Timing of the slave camera to THROUGH.
• Be sure to set the Trigger Selection of the slave camera to TRIG1.
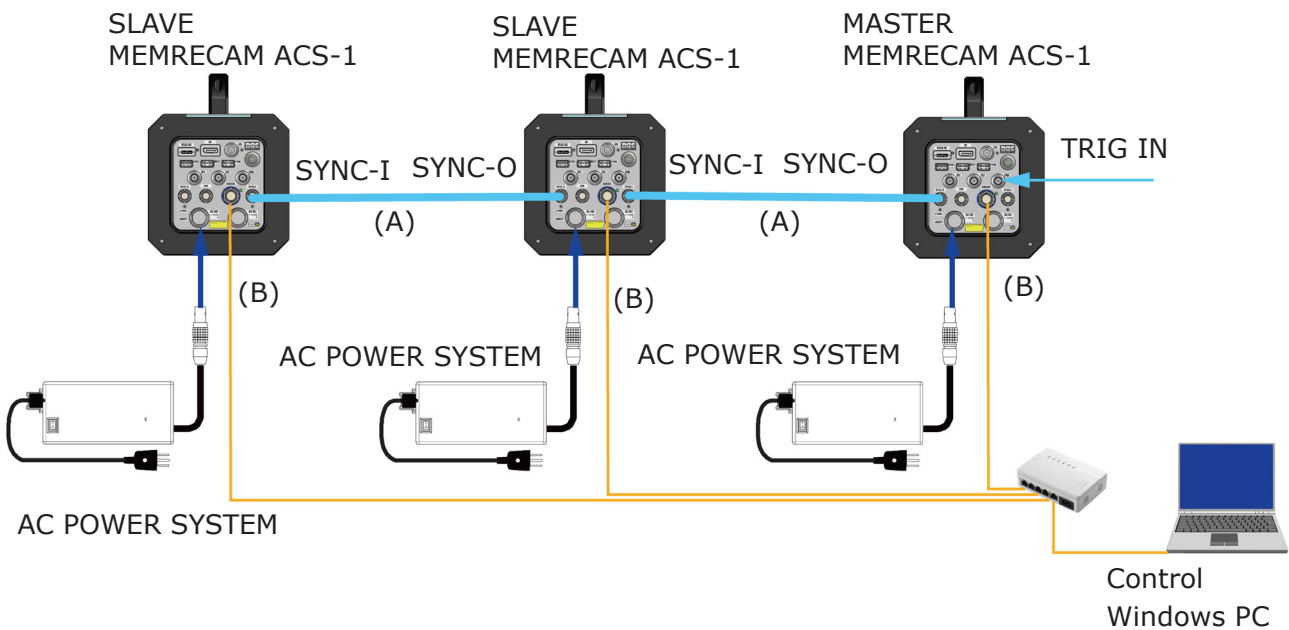
SLAVE
MEMRECAM ACS-1

SLAVE
MEMRECAM ACS-1

MASTER
MEMRECAM ACS-1

TRIG IN

SYNC-I SYNC-O   SYNC-I SYNC-O

(A)   (A)

(B)   (B)   (B)

AC POWER SYSTEM   AC POWER SYSTEM

AC POWER SYSTEM

Control
Windows PC

Note)
(A) Connect with ACS SYNC cable
(B) Connect with J3 branch cable or simple J3 cable

	ACS-1	
	MASTER	SLAVE
ACS SYNC cable connection destination	SYNC-O	SYNC-I / SYNC-O
Frame Synchronization	Internal Sync	IRIG sync
Trigger input destination	TRIG1 / TRIG2	SYNC-I
Trigger Selection	TRIG1 / TRIG2	TRIG1
TRIG Input	Nega	Nega
Trigger Output Mode	TRIGOUT	TRIGOUT
Trigger Output	Nega	Nega
TRIG OUT Timing	CENTER	THROUGH

3

Basic Operations

Viewing the Screen

Displayed on the monitor. Live images and video playback are superimposed with the recording and playback settings and information.
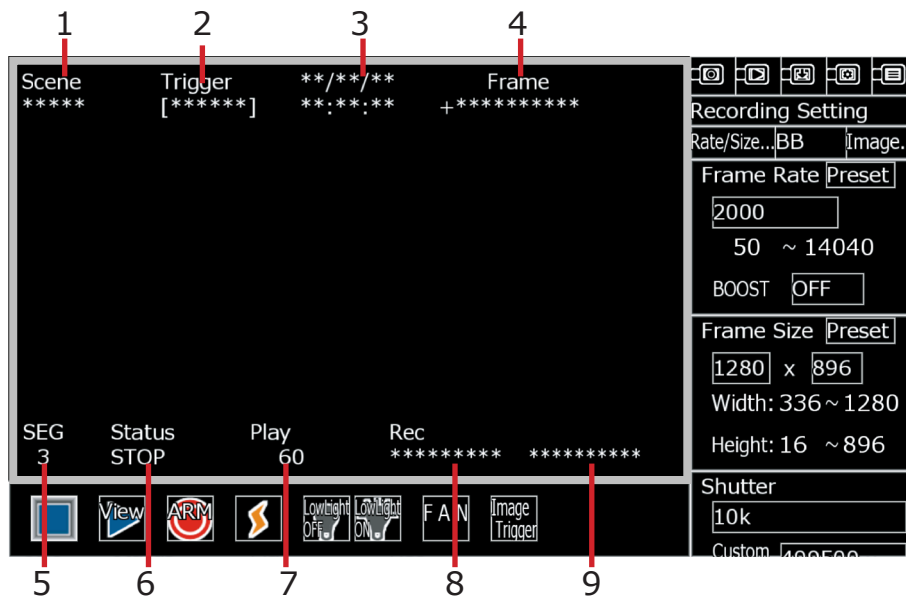
V-PAD, Monitor Display
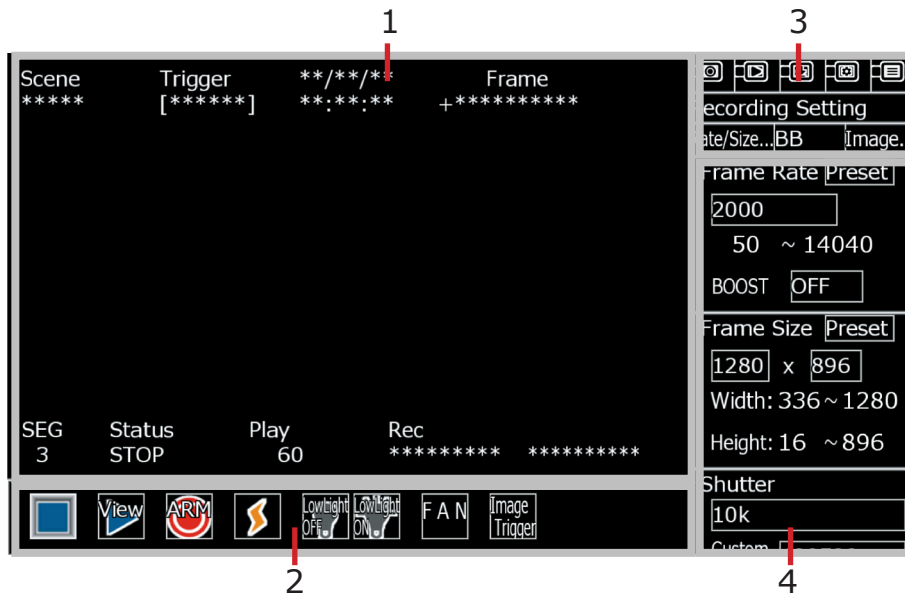
1 **Image information display area** (▶️📖 10-52)

Shows the recording information.

2 **Main tool panel** (▶️📖 3-12)

Change by selecting the camera settings tab icon to control the main unit of the camera and playback.

3 **Camera settings tab icons** (▶️📖 3-16)

Tab for each type of camera settings panel on the camera.

The icon is shown at the top. The names of the tab icons are shown in the selections under the icon. Under the tab icon names are the keywords relating to the tab icons in the selection.

4 **Camera settings panel** (▶️📖 3-16)

Camera settings can be implemented for the settings and file operation corresponding to the camera settings tab icons.

The details of the information displayed vary according to the operation and settings. Check the page for each function for details.

Video Information Display

1 Scene number
  Increases by 1 for each recorded image.

2 Trigger timing (▶▶ 4-31)
  Shows the current trigger timing settings.

3 Trigger time (▶▶ 3-27)
  Shows the input time for the image trigger recorded.

4 Frame counter (▶▶ 9-11)
  Shows the current frame number and the number of frames remaining that can be recorded. Also displays the frame information at the marks.

5 Memory segment number (▶▶ 9-15)
  The memory segment number currently being recorded or played back.

6 Camera status
  Current camera operation.

7 Playback speed (▶▶ 5-6)
  Image playback speed (Unit: frames per second)

8 Frame rate (▶▶ 4-5)
  Recording speed. The recorded image is displayed in the STOP mode and PLAY mode, while the current setting is shown in the VIEW mode, ARM mode, and REC mode. (Unit:frames per second)

9 Shutter speed (▶▶ 4-27)
  The exposure time of the shutter. The recorded image is displayed in the STOP mode and PLAY mode, while the current setting is shown in the VIEW mode, ARM mode, and REC mode. (Unit: second)

The details of the information displayed vary according to the operation and settings. Check the page for each function for details.

Symbols Shown on the Frame Counter

Symbols indicating the frame status shown during recording and playback are shown on the frame counter.

① ② ③
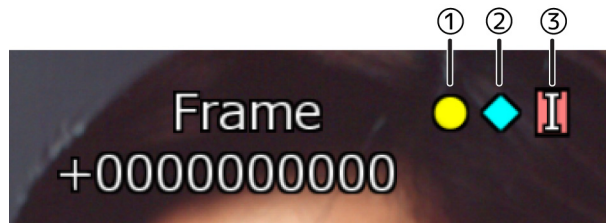
Frame
+0000000000

Number	Symbol	Description	⏩📖
1	◯	Trigger symbol, event symbol The frame currently shown are the trigger frame and the event frame.	3-28 9-19
2	◇	EVENT input symbol Frame where signals input after the EST2/EVENT input are detected.	7-32
3	Ⅱ	IRIG symbol Shows the IRIG synchronization time setting.	7-34

3-5

Status LED

PWR

CAM MODE

POWER SW

ETHERNET

3-5
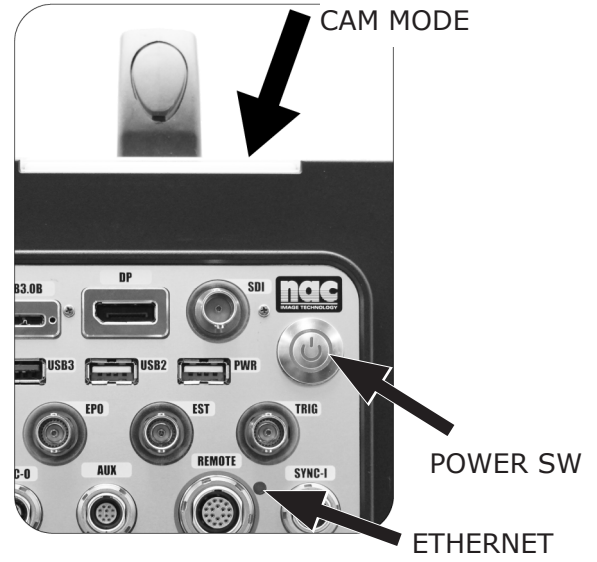
| LED	LED status	Operation	▸▥
POWER SW	Green	Camera power ON	2-17
	Off	Camera power OFF	
ETHERNET	Yellow green	1000BASE-T network	-
	Orange	100BASE-TX network	-
	Off	No network connection Or the power is OFF	-
CAM MODE	Orange	REC mode (camera image output, recording in the camera image memory after trigger detection)	3-27
	Blue	STOP/READY mode (Memory image output. Play mode or transfer mode after startup)	3-22
	White	VIEW mode (camera image output, recorded memory details are saved)	3-23
	Magenta	ARM mode (camera image output, recorded memory details are deleted and the camera image is recorded in the memory)	3-25
	Off	Power OFF or starting up	-
	Blinking	Set in EST mode and the EST pulse is input. But only with the VIEW, ARM, REC modes	-
PWR	Green	Normal	-
	Red	Failure	9-44
	Red (blinking)	Starting up / Shutting down	-
	Orange	Camera power is OFF with the power switch while normal voltage is being supplied by the external power source	2-9
	Orenge (blinking)	Camera power is OFF with the power switch while abnormal voltage is being supplied by the external power source	
	Alternating green and red (blinking)	Thermal shutdown implemented (Note)	-
	OFF	Power OFF (No external power source)	-

3-6

3-7

(Note) A thermal shutdown is when the temperature of the ACS-1 is abnormally high and the power shuts OFF automatically. If there is a thermal shutdown, turn the AC adapter power OFF once.

Basic
Operations

3-7

V-PAD Operation

The operation and settings for recording and playback of the MEMRECAM ACS-1 can be done from the V-PAD.

■Adjust the Aperture

Operation of the V-PAD can be performed via touching, touch and holding, swiping, pinching in and pinching out.
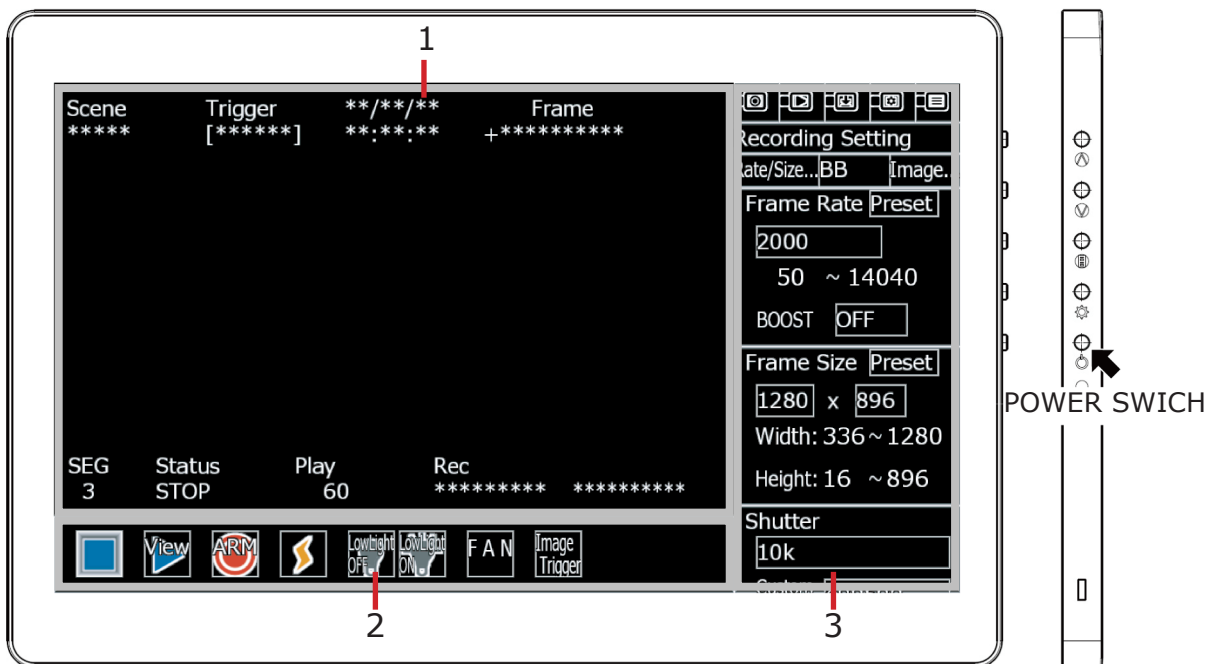

Touch operation

| 1 | •If a spot on the screen where there is no writing is touched, the written information is not shown and only the recorded image is displayed. (1)
•By not showing the written information, the screen refresh rate can be increased.
•Touch the screen again to display the written information again. (1) | |

3-8
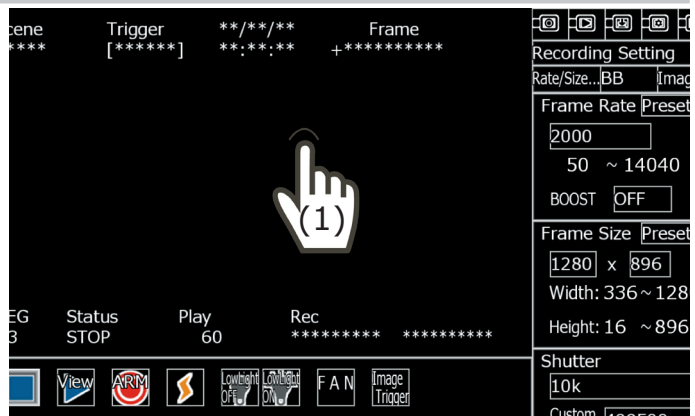
- By touch and holding on the screen (about 1 second), a box will appear and after releasing, a popup window will appear. (2)
- Select the desired item in the popup window by touching it to change the settings.(3)
- Tap on the"×"in the upper right corner of the popup window to close the window.(4)
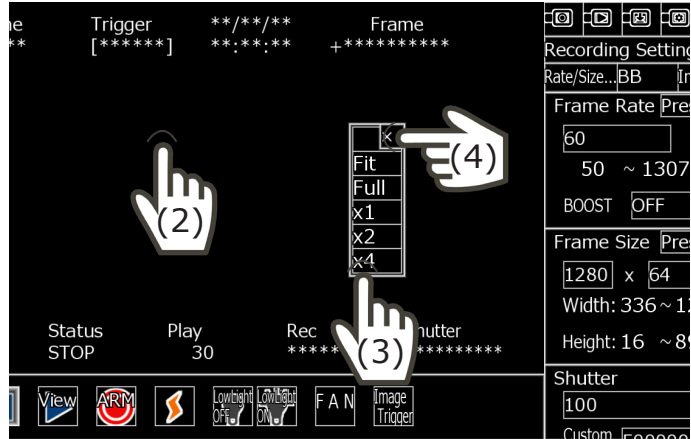
| 1	Fit	Enlarges or reduces the display of the recorded image to fit on the display screen.
	Full	Enlarges the display to fit the entire screen, with the vertical resolution of the recorded image at 896 to 48. If the vertical resolution of the recorded image is less than 48, it is enlarged for display up to 16 times the magnification.
	x1	Using 1280 pixels as the standard display screen horizontal resolution and 1 for when displayed corresponding to the horizontal resolution of the recorded image, (horizontal resolution of the recorded image/1280) x1 horizontal fraction is displayed on the screen.
	x2	Using 1280 pixels as the standard display screen horizontal resolution and 1 for when displayed corresponding to the horizontal resolution of the recorded image, (horizontal resolution of the recorded image/1280) x2 horizontal fraction is displayed on the screen.
	x4	Using 1280 pixels as the standard display screen horizontal resolution and 1 for when displayed corresponding to the horizontal resolution of the recorded image, (horizontal resolution of the recorded image/1280) x4 horizontal fraction is displayed on the screen.

1

- Swipe inside the frame to move horizontally and vertically.
- Remove your fingers to return the image outside the range that can be set to the inside of the range that can be set.(5),(6)
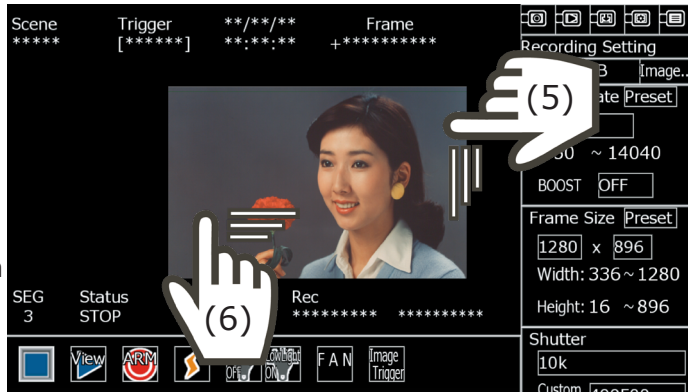
- Swipe up inside the popup window(7) to show the items that can be selected by sliding.
- Swipe side to side inside the popup window (8) to change the location of the popup window. Hold to move to the desired location.
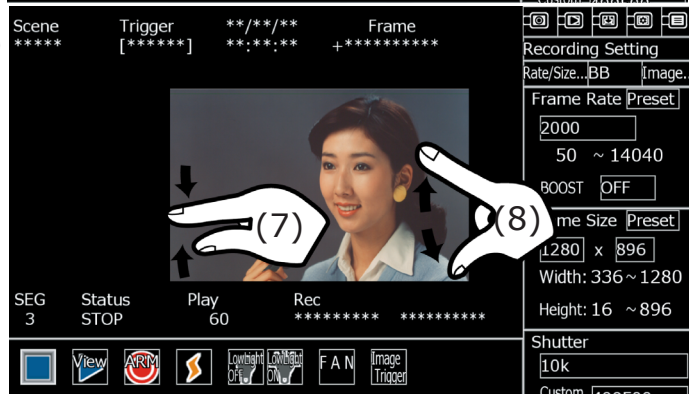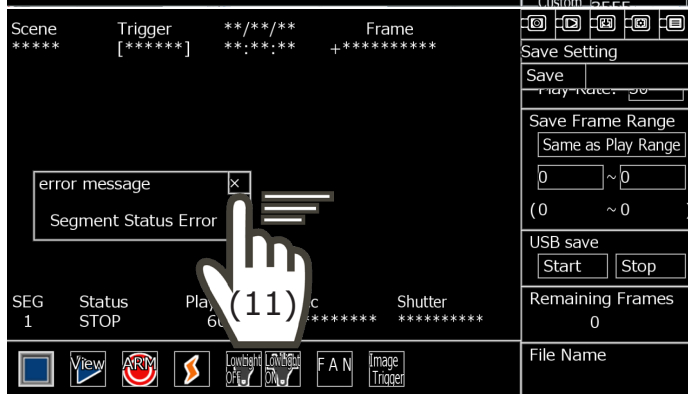
- Swipe up inside the popup window(9) to show the items that can be selected by sliding.
- Swipe side to side inside the popup window (10) to change the location of the popup window. Hold to move to the desired location.
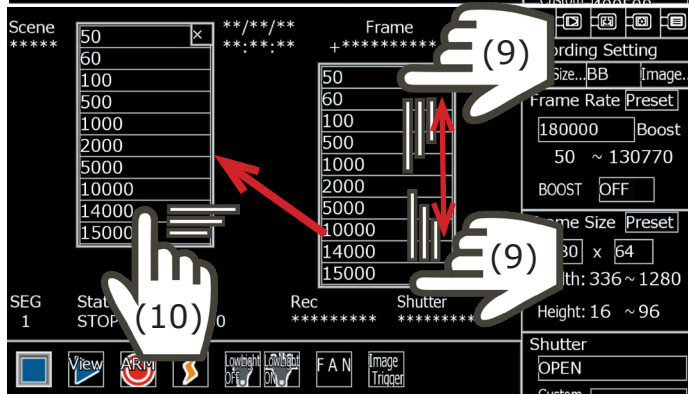
- If an error message (a message with a white frame) appears, tap the "x" in the top right corner to close the message.(11)

1	•If a warning (a message with a yellow frame) appears, tap inside the yellow frame to close the message. (12)
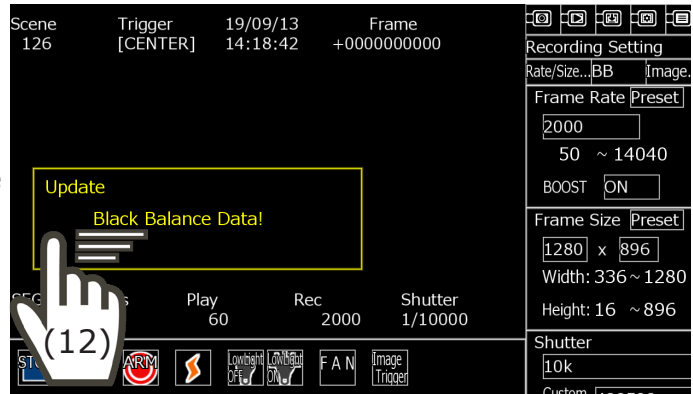
2	•Touch to select each icon. (1)

3	•After touching to select the camera setting tab icon at the top (1), touch to select the third tab (2) and access the camera settings panel for the selected tab. •Swipe the camera settings panel up/down (3) to show the items that can be selected, and touch the target item inside the box to access that popup window. (4)

3-11

Camera Operation

Use the main tool panel found at the bottom left of the V-PAD to operate the camera.

Switching To/From the Main Tool Panel

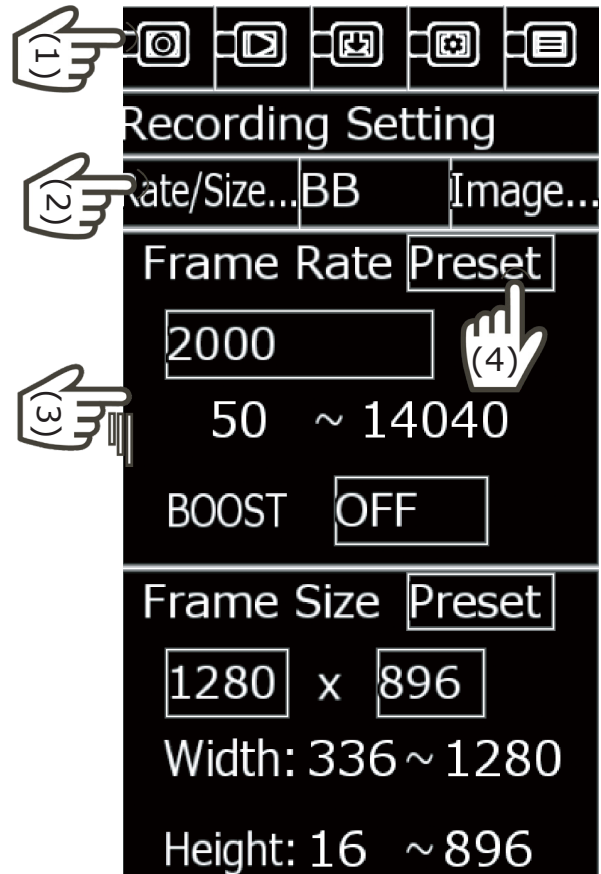The main tool panel found at the bottom left of the V-PAD can change the function to the recording tool panel or the playback tool panel by selecting the recording settings tab icon or the playback settings tab icon. The display is not retained if another settings tab icon is selected.

■ Main Tool Panel When the Recording Settings Tab Icon is Selected

The main tool panel display when the recording settings tab icon is selected.

Select the recording settings tab icon.

(00457)H
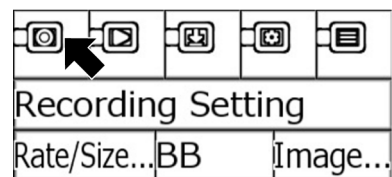
Icons shown on the main tool panel			
Item	Description	When Operation is Enabled	Currently Selected State
■	Stop •Stops.	STOP	■
▶	Live •Live display.	View	▶
◉	Record •Switches to the record mode.	ARM	◉
⚡	Trigger •Trigger input while recording.	REC	⚡
💡	Low Light Off •Turns the low light OFF when live.	LowLight OFF	💡
💡	Low Light ON •Turns the low light ON when live.	LowLight ON	💡
FAN	FAN •Fan control	FAN	FAN
Image Trigger	Image Trigger	Image Trigger	Image Trigger

3-13

■ Main Tool Panel (When the Playback Settings Tab Icon is Selected)

The main tool panel display when the playback settings tab icon is selected.
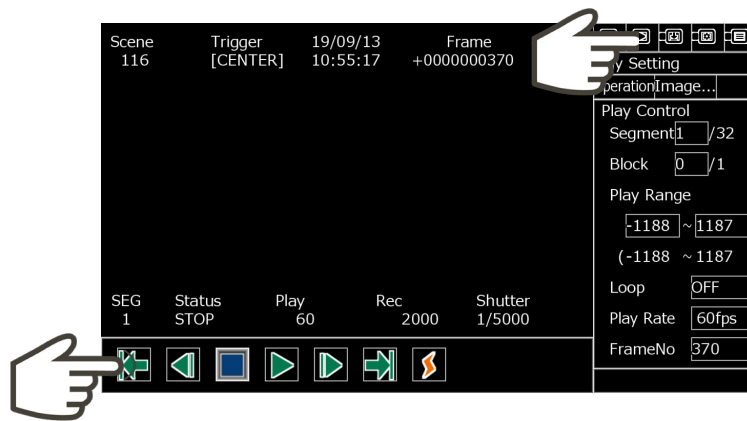
Select the playback settings tab icon.
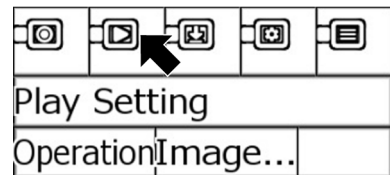
Icons shown on the main tool panel		Currently Selected State
Item	Description	Currently Selected State
	To the first frame •Moves the current frame to the start frame.	
	Live •Live display.	
	Stops •Stops the playback.	
	Playback •Plays back.	
	One frame forward •Moves the current frame forward one frame.	
	To the final frame •Moves the current frame to the end frame.	
	Trigger jump •Moves the current frame to the trigger frame. If dividing blocks, moves to the trigger frame for the next block.	

3-15

■Camera Settings Tab Icons

Icons to access each of the settings panels in tab format.
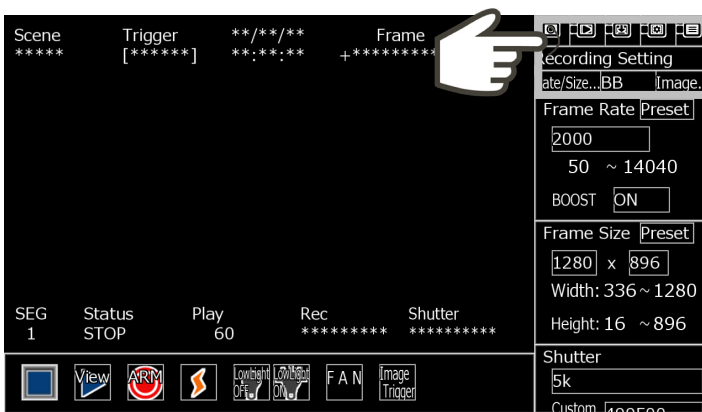
Camera Settings Tab Icons
Current state
Recording basic settings

Camera Settings Tab Icons

	Recording Settings Tab Icon •Recording settings and display settings.	
	Play Settings Tab Icon •Play settings and display settings for the playback image.	
	Save Settings Tab Icon •Save and settings.	
	Detailed Settings Tab Icon •Detailed settings.	
	Utility Tab Icon •Utility settings.	

■◎ Recording Setting

Recording Setting
Rate/Size... BB Image...
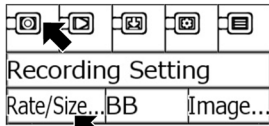
•Recording basic settings

Rate/Size ┄┄┄►

Frame Rate	•Frame rate
Frame Size	•Frame size
Shutter	•Shutter speed
Trigger Timing	•Trigger timing

Recording Setting
Rate/Size... BB Image...
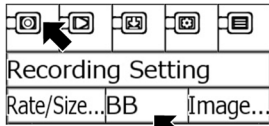
•Black balance setting

BB ┄┄┄►

Calculate BB	•Black balance calculation execution
Apply at Live	•Apply to BB Live
Apply at Play	•Apply to BB playback image
Auto BB Calculation	•Auto black balance setting
Starting Live	•Execute Auto BB after VIEW
Starting ARM	•Execute Auto BB after VIEW
Rec Completed	•Execute Auto BB after recording ends
Frame Rate / Size Changed	•Auto BB recording speed or execution after frame size change
Power On	•Execute after starting Auto BB
Low Light Changed	•Execute Auto BB after Low Light change

Recording Setting
Rate/Size... BB Image...

Image... ┄┄┄┄┄┄►

| Image Correction | •Gain, Gamma, Knee, Enhance, White Balance, Chroma |
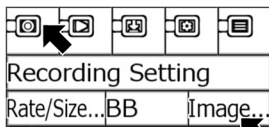
•Settings related to display of recorded images

(00457)H

■▶ Play Setting

Play Setting
Operation | Image...
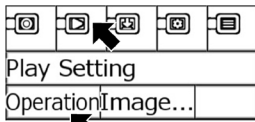
•Playback basic settings

Operation ·········▶ Play Control   •Set segment selection,
playback range,
loop playback, playback
speed to be played

Play Setting
Operation | Image...
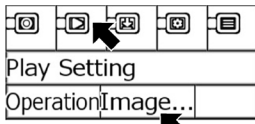
•Settings related to display of playback image

Image... ·········▶ Image Correction   •Gain related to playback,
gamma correction, white
balance setting

■⬇ Save Setting
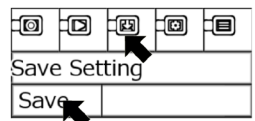
Save Setting
Save

•Save setting and operation

Save ·········▶ File Type   •USB storage extension
setting

·········▶ AVI(MJPEG) setting   •AVI (MJPEG) compression
quality setting

·········▶ AVI setting   •AVI playback rate setting

·········▶ Save Frame Range   •USB storage range
setting

·········▶ USB save   •Stop USB save

·········▶ Remaining Frames   •Display of the remaining
number of save work

·········▶ File Name   •Display saved file name

3-18

■⚙ Detail Setting

Detail Setting
Memory | Signal | RecA | RecB
•Memory Segmentation settings

Memory ·······▶ Memory Segmentation •Memory Segmentation

Detail Setting
Memory | Signal | RecA | RecB
•Signal control setting

Signal ·······▶ Input Signal(1of 3 Trigger) •Trigger input

·····▶ Input Signal(2 of 3 EST) •EST input

·····▶ Input Signal (3 of 3 ARM) •ARM input

·····▶ Output Signal •Output signal

Detail Setting
Memory | Signal | RecA | RecB
•Recording detailed setting A

Rec A ·····▶ Special Recording(1 of 4)

•Recording method setting
 MULTI Recording setting

·····▶ Special Recording(2 of 4) •Sync setting

Detail Setting
Memory | Signal | RecA | RecB
•Recording detailed setting B

Rec B ·······▶ Special Recording(3 of 4)

•Variable recording speed setting

·····▶ Special Recording(4 of 4) •Frame Straddling setting

·····▶ Sensor •Sensor setting

■▤ Utility Setting

Utility
•Utility

Utility ·······▶ Factory Reset •Execute factory shipping settings

·····▶ IP Address •IP Address Display

·····▶ Firmware Ver: •Firmware version display

·····▶ Hardware Rev: •Hardware revision display

·····▶ Center Point •Center point display setting

·····▶ Frame Format •Setting of recording information display (Frame)

Display the Target Settings Screen

■ Display the Target Settings Screen

This is an example of confirming the current "trigger timing" from the top screen

	1	Select the recording settings tab icon
Rate/Size...	2	Select the Rate/Size tab

3 | Under the tab Rate/Size, touch inside the box and swipe up/down to slide and display the trigger settings. Verify the box under Trigger Timing. In the example, the "CENTER" trigger is set.
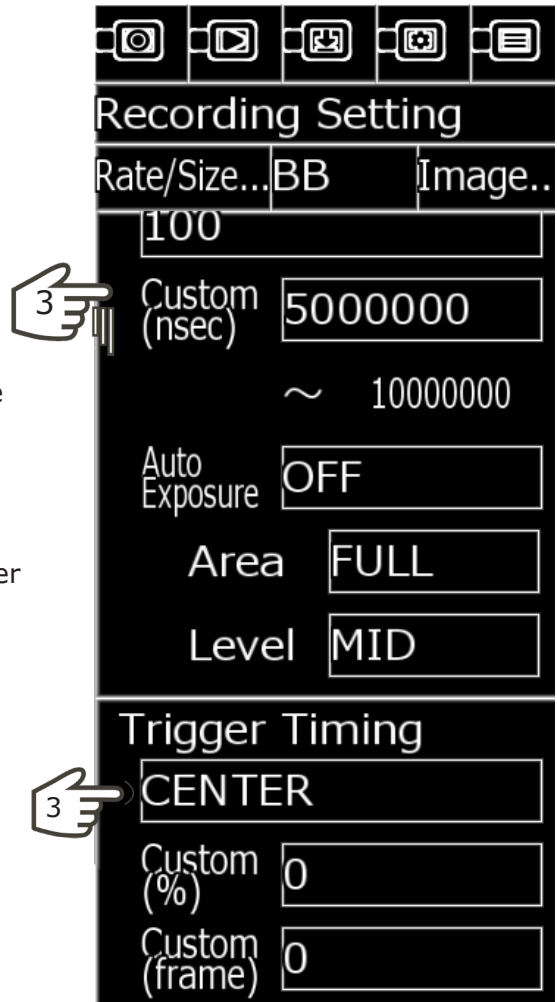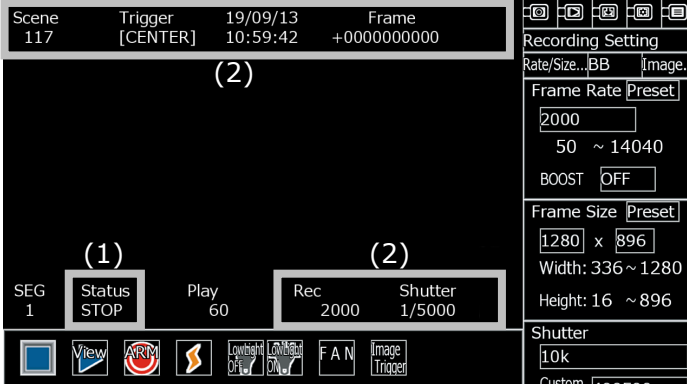
Stop (STOP Mode)

After startup, the MEMRECAM ACS-1 enters the STOP mode. During the STOP mode, the image
is stopped and frame jump or frame by frame advance can be performed.

■Switch to the STOP Mode

	1	Select the recording settings tab icon.
	2	Press STOP on the main tool panel •It switches to the STOP mode from the camera when not in the STOP mode, including the VIEW mode and ARM mode. •The status LED for the CAM MODE on the rear panel of the main unit will be lit in blue.

Camera Settings Tab Icons

•The image saved in the memory is shown.

•Information on the image saved in the memory and playback are displayed as superimposed information, and the status is shown as STOP. (1)

•If the image is not saved in the memory, the image recorded as a test during auto-diagnosis during startup is displayed. At this point, superimposed information is shown with an "*". (2)

CHECK •During the STOP mode, settings for record, play and save cannot be made.
•Recording settings (▶ 📖 4-1) ,Playback settings (▶ 📖 5-1) , Save settings
  (▶ 📖 6-1)

3-22

Show the Live Image (VIEW mode)

After startup, the MEMRECAM ACS-1 enters the STOP mode. During the STOP mode, the image is stopped and frame jump or frame by frame advance can be performed.

■ Switch to the VIEW Mode

■○	1	Select the recording settings tab icon.	**Recording Setting** Rate/Size...BB Image...
View	2	Press VIEW on the main tool panel •It switches to the VIEW mode from the STOP mode. •You can automatically get the black balance when switching to the VIEW mode. (»▥ 4-43) •Adjust the zoom or focus of the lens, the subject or the recording settings while looking at the live image in the VIEW mode. •The status LED on the rear panel on this unit for the CAM MODE will be lit in white	

Camera Settings Tab Icons
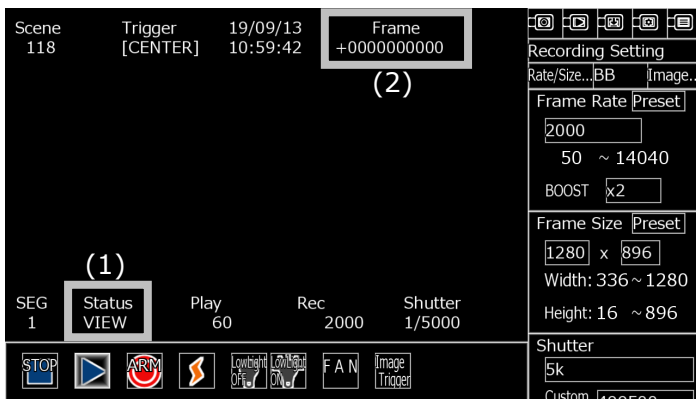
•The image recorded is shown live. The image is not saved.

•The current recording settings are shown as superimposed information, and the status is shown as VIEW. (1)

•The superimposed information from the STOP mode before switching to the VIEW mode is shown as is on the frame counter. (2)

Scene 118	Trigger [CENTER]	19/09/13 10:59:42	Frame +0000000000 (2)

Recording Setting
Rate/Size...BB Image...
Frame Rate Preset
2000
   50 ~ 14040
BOOST x2
Frame Size Preset
1280 x 896
Width: 336 ~ 1280
Height: 16 ~ 896
Shutter
5k
Custom

SEG 1	Status VIEW	Play 60	Rec 2000	Shutter 1/5000

STOP ▶ ARM ⚡ Lowlight Off Lowlight On F A N Image Trigger

CHECK
•During the VIEW mode, recording settings can be made.
•Recording settings (»▥ 4-1)

Basic Recording Settings

Select the frame rate, shutter speed and trigger timing corresponding to the action recorded.

Basic Recording Settings

Set according to the phenomenon or subject to be shot.

- Select the frame rate. (➡️📖 4-5)

- Select the shutter speed. (➡️📖 4-27)

- Select the trigger timing. (➡️📖 4-31)

Black Balance

With the ACS-1, the black balance can be automatically obtained by the sensor when "switching to VIEW", "switching to ARM", "ending REC".

- Obtain the black balance manually. (➡️📖 4-42)

- Set the automatic black balance. (➡️📖 4-43)

Start Recording (ARM Mode)

Switch to the ARM mode after implementing the recording settings and start recording.
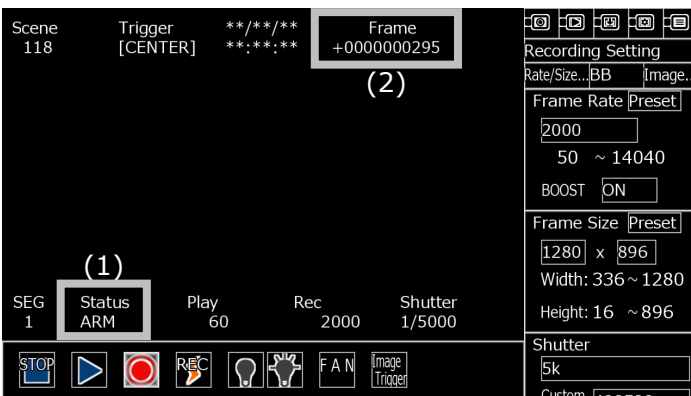
Attention
- •Before switching to the ARM mode, save the recorded images required in the memory.
- •If switching to the ARM mode, the images saved in the memory are overwritten and deleted.
- •After verifying if it is acceptable to delete the images, switch to the ARM mode.

■Switch to ARM mode and start recording

■▶◎	1	Select the recording settings tab icon.
ARM	2	Press ARM on the main tool panel •Recording settings cannot be changed in the ARM mode. •The status LED for the CAM MODE on the rear panel of the main unit will be lit in magenta.

Camera Settings Tab Icons

Scene 118　Trigger [CENTER]　**/**/**　**:**:**　Frame +0000000295 (2) (1) SEG 1　Status ARM　Play 60　Rec 2000　Shutter 1/5000	Recording Setting Rate/Size...BB　Image... Frame Rate Preset 2000 50 ~ 14040 BOOST ON Frame Size Preset 1280 x 896 Width: 336~1280 Height: 16 ~896 Shutter 5k Custom

- •The image photographed is shown live. The image is not recorded.
- •The settings for the current recording are displayed as superimposed information, and the status is shown as ARM. (1)
- •The number of recordings possible after trigger input is shown on the frame counter. (2)

CHECK
- •You can switch to the ARM mode with external input signals (ARM command). (▶🕮 7-14)
- •Depending on the recording method, it automatically switches to the ARM mode during auto switching of blocks and segments.

Attention
- •Recording settings cannot be changed in the ARM mode. To change the recording settings, change the settings after switching to the STOP mode.

Ring Buffer

In the ARM mode, the ACS-1 continues recording images to the memory. The memory has a cyclic structure (ring buffer), and once that section of the memory is full, the old images are erased in the order from the first image recorded and they are overwritten by the new images.
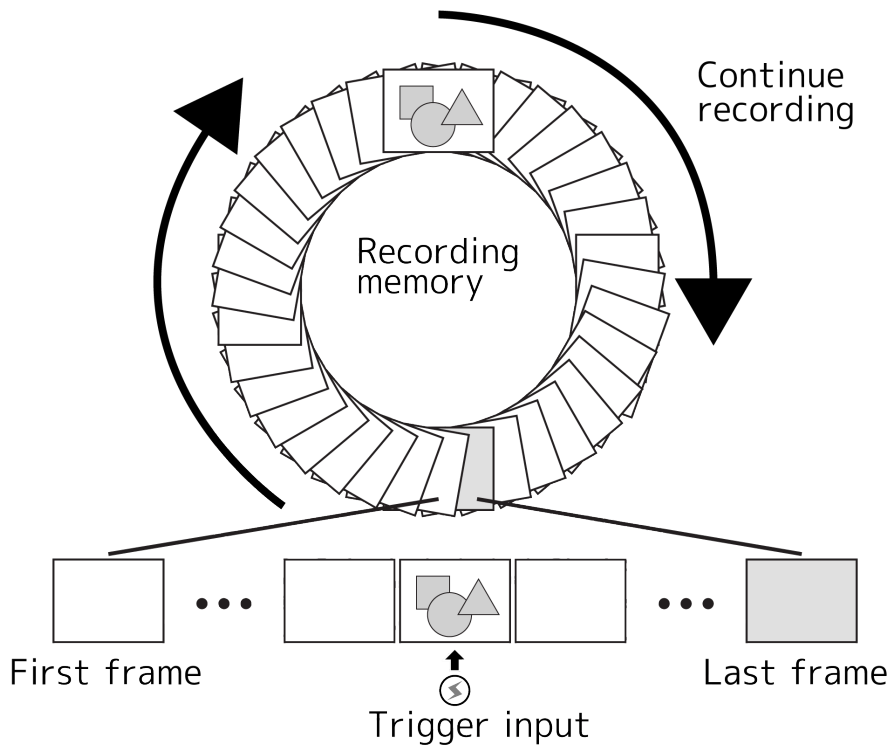
This operation continues until a trigger is input, when the overwrite recording is stopped according to the trigger input and trigger timing settings.
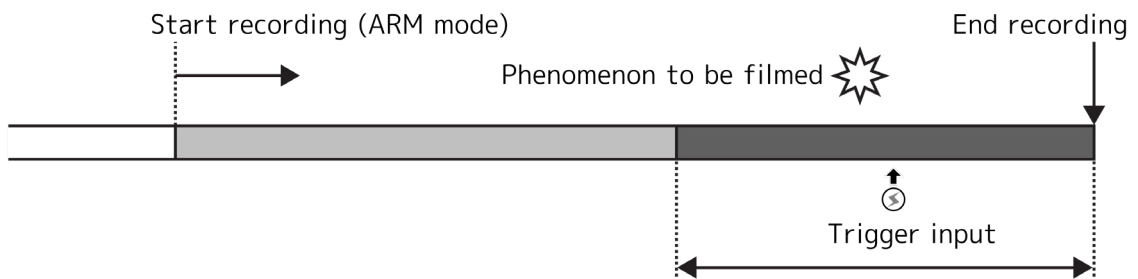
Trigger Input (REC Mode)

Input the trigger that matches the images to be photographed and then end recording.

■Trigger Input
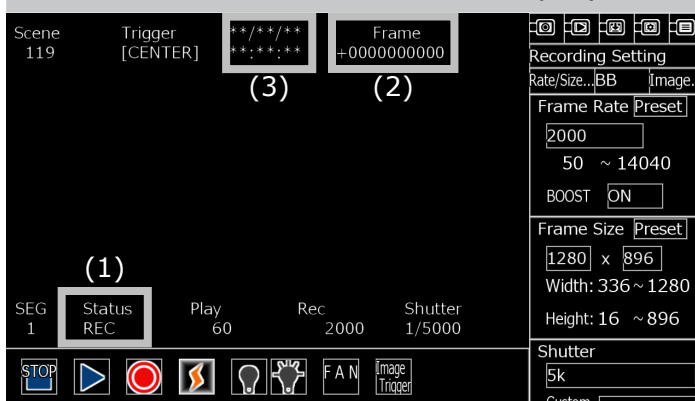
Input the trigger that matches the images to be photographed and then end recording according to the trigger timing settings.

■◉	1	Select the recording settings tab icon.	Recording Setting Rate/Size...BB Image...
REC	2	Press the TRIG key while in the ARM mode •It switches to the REC mode. •It automatically switches to the STOP mode from the REC mode when the recording of the number of frames set in the trigger timing is completed. •The status LED for the CAM MODE on the rear panel of the main unit will be lit in orange.	

⚠ Attention
•You can also input with the trigger instead of operating the keys on the V-PAD.
•Input TRIG with external trigger input signals (TRIG1•TRIG2) (▶📖 7-9)
•Trigger input (image trigger) can be automatic by changing the image during recording.(▶📖 4-38)

REC Mode Monitor, V-PAD Display

Scene 119	Trigger [CENTER]	**/**/** **:**:**	Frame +0000000000

(3)   (2)

Recording Setting
Rate/Size...BB   Image...
Frame Rate [Preset]
2000
50 ~ 14040
BOOST [ON]
Frame Size [Preset]
1280 x 896
Width: 336~1280
Height: 16 ~896
Shutter
5k
Custom 400500

(1)

| SEG 1 | Status REC | Play 60 | Rec 2000 | Shutter 1/5000 |

STOP ▷ ◉ ⚡ 💡 🐾 FAN Image Trigger

Trigger [CENTER]	19/09/13 14:18:42	Frame +0000000000

(4)

Recording
Rate/Size...B
Frame R
2000

•The image photographed is shown live.
•The settings for the current recording are displayed as superimposed information, and the status is shown as REC. (1)
•After trigger input, the number on the frame counter decreases for each image recorded (2). Recording stops when it reaches 0.
•"*" is shown for the trigger time (3). Stop recording and after switching to STOP, the trigger time input is displayed (4).

Play (PLAY Mode)

Plays back the recorded images.

■ Play

▪▶	1	Select the play settings tab icon	
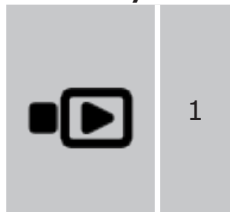
Recording Setting
Rate/Size...BB   Image...
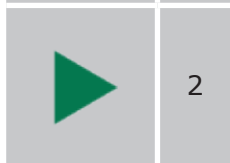
▶	2	Press PLAY on the main tool panel •It switches to the PLAY mode from the STOP mode and plays the recorded images.

Monitor During Play (PLAY Mode), V-PAD Display

Scene 120	Trigger [CENTER]	19/09/13 11:18:20	Frame ● +0000000000

Play Setting
Operation Image...
Play Control
Segment 1 /8
Block 0 /1
Play Range
-1187 ~ 1186
(-1187 ~ 1186)
Loop OFF
Play Rate 60fps
FrameNo 0

(1)

SEG 1	Status Play	Play 60	Rec 2000	Shutter 1/5000

Frame
+0000000000

Play Setting
Operation Image...
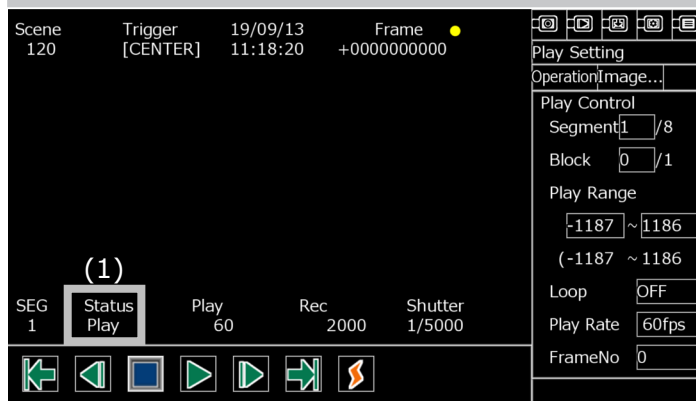
Event mark

•Plays the images recorded in the memory.
•Information on the image saved in the memory and playback are displayed as superimposed information, and the status is shown as PLAY (1).
•Event marks are shown on the trigger frame and the event frame even during the STOP mode and the LOOP mode (▸▯ 5-5).

✔CHECK •During the STOP mode and the PLAY mode, you can make settings to check the recorded image, fast forward/rewind or conduct repeated playback.
•Advance frame, rewind frame. (▸▯ 3-29)
•Change the frame rate. (▸▯ 5-6)
•Jump to a specific frame. (▸▯ 5-7)
•Set the playback range. (▸▯ 5-4)
•Play a repeated loop. (▸▯ 5-5)

Forward Frame • Rewind Frame, Jump to Start • End • Trigger Frame

■ Forward Frame • Rewind Frame, Jump to Start • End • Trigger Frame

A description is given for an example where the recorded image (with the recorded image data from the CENTER trigger to Frame -0000038035 to Frame +0000038034) is shown at the 1000th frame Frame+0000001000).

■▶	1	Select the play settings tab icon.
▶|	2	Move the current frame forward one frame •(1) The frame display shows +0000001001. Rewind the current frame one frame •(2) The frame display shows +000000999.
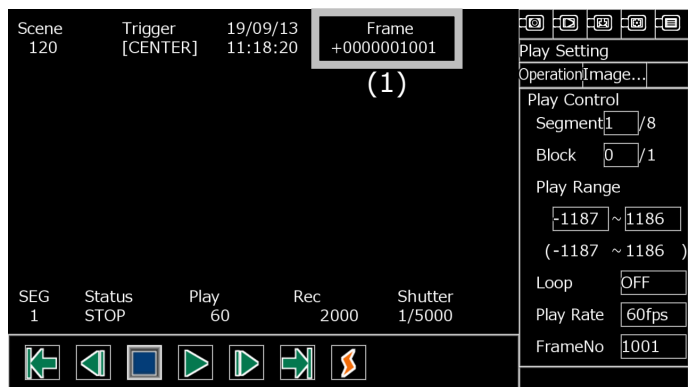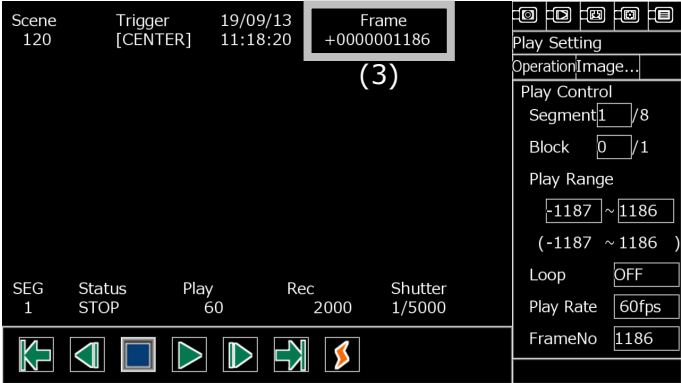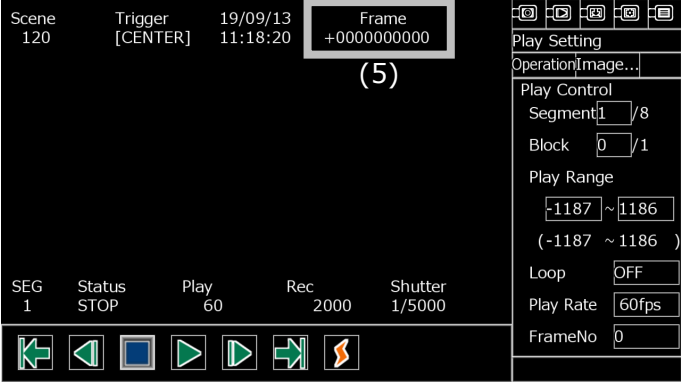
		Move the current frame to the end frame •(3) The frame display shows +0000038034 (end frame).	Scene 120 Trigger [CENTER] 19/09/13 11:18:20 Frame +0000001186 (3) SEG 1 Status STOP Play 60 Rec 2000 Shutter 1/5000 Play Setting Operation Image... Play Control Segment 1 /8 Block 0 /1 Play Range -1187 ~ 1186 (-1187 ~ 1186) Loop OFF Play Rate 60fps FrameNo 1186
2		Move the current frame to the start frame •(4) The frame display shows -0000038035 (start frame).	Scene 120 Trigger [CENTER] 19/09/13 11:18:20 Frame -0000001187 (4) SEG 1 Status STOP Play 60 Rec 2000 Shutter 1/5000 Play Setting Operation Image... Play Control Segment 1 /8 Block 0 /1 Play Range -1187 ~ 1186 (-1187 ~ 1186) Loop OFF Play Rate 60fps FrameNo -1187
		Move the current frame to the trigger frame. If dividing blocks, jump to the trigger frame for the next block. Note1,Note2 • (5) The frame display shows +0000000000 (trigger frame).	Scene 120 Trigger [CENTER] 19/09/13 11:18:20 Frame +0000000000 (5) SEG 1 Status STOP Play 60 Rec 2000 Shutter 1/5000 Play Setting Operation Image... Play Control Segment 1 /8 Block 0 /1 Play Range -1187 ~ 1186 (-1187 ~ 1186) Loop OFF Play Rate 60fps FrameNo 0

Note1) If there is no trigger frame in the recorded images, jump to the end frame.

Note2) Use the event recording function only when the event frame is recorded.

See (⇥▥ 7-25) for event recording

Save Images

■Connect a USB Storage Device

Connect a flash drive or a hard disc with a USB3.0 connection to save images.

Specifications for USB devices that can be used.

Standards	USB mass storage class
Interface	USB3.0B(USB 3.0) / USB3(USB 3.0) / USB2(USB 2.0)
Terminal shape	USB A socket, USB microB socket
Compatible format	FAT / FAT32 / exFAT / NTFS

Format the USB storage device (USB media) for the PC (PC using the control software MLink) where the saved images will be played.

Refer to the user's guide included with the USB device for USB storage device use information.

Connect to USB3 connector

1 •With the power ON, plug the USB storage device into the USB connector.

•There are 4 USB connectors on the rear panel. Select the connector corresponding to the device connected.

USB3.0B	For downloading to PC (not for camera control)
USB3	compatible with USB3.0/2.0 standards
USB2	compatible with USB2.0 standards (for V-PAD signal cable)
PWR	for the power supply (for V-PAD auxiliary power)

Attention •The ACS-1 uses Windows Embedded as the operating system for the camera. Write protection is enabled on the system area to protect the camera system but you should be very careful of viruses or malware on the USB device.

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■Save Images

Connect a flash drive or a hard disc with a USB3.0 connection to save images.
Specifications for USB devices that can be used.

■⬇ icon	1	Select the save settings tab icon
USB save	2	Slide the SAVE tab bottom box to display USB save
Remaining Frames / File Name	3	Select the desired item under the USBsave box •Start : Start saving. •Stop : Stop saving. Also, save information is shown on the above buttons. •Remaining frame: The number of frames remaining to be saved is shown. •File Name : The file name is shown while saving.

```
13          Frame                    [icons]  1
20      -0000001187              S   etting
                                  Save
                                  Play Rate:  30
                                  Save Frame Range
                             2    Same as Play Range
                                  -1187  ~ 1186
                                  (-1187   ~ 1186    )
                                  USB save
                             3    Start      Stop
        Rec        Shutter        Remaining Frames
        2000       1/5000              2254
        ⬅        ⚡               File Name
                                         MCFF0002.MCF
```

If there isn't enough space in the save destination, the images cannot be saved. Either change the settings to decrease the save range or use a device with sufficient memory.

Basic
Operations

•The time it takes to save will vary according to the performance of the connected
CHECK   device.

•Saved image files cannot be played back on the ACS-1.

•Saved image files can be played back on the control software "MLink".

•Refer to the "MLink user's guide" for details.

Attention •MCFF is the image file format just for the MEMRECAM. (⏩ 📖 6-5)

•Videos can be save in the AVI format. (⏩ 📖 6-6)

•Video files can be saved directly to the control PC from the MLink. Refer to the
"MLink user's guide" for details.

4

Recording Settings

Items for the Recording Settings

■◎ Recording Setting

■Items that Can Be Set From Rate/Size

This item can be set by selecting the Rate / Size tab displayed after selecting the recording setting tab icon.

Setting	Details		▶▶📖
Frame Rate	•Preset	Frame rate setting	4-5
	•Custom	Frame rate setting	4-6
	•BOOST	Boost mode setting	4-18
Frame Size	•Preset	Frame size setting	4-7
	•Custom	Frame size setting	4-8
Shutter	•Preset	Shutter speed setting	
	•Custom	Shutter speed setting	
	•Auto Exposure ON/OFF	Automatic shutter speed setting	4-27
	•Area	Automatic shutter speed decision range setting	4-28 4-29
	•Level	Automatic shutter speed level setting	
Trigger Timing	•Preset	Trigger timing setting	4-31
	•Custom(%)	Trigger timing setting	4-36
	•Custom (frame)	Trigger timing setting	4-37

Recording Setting

Rate/Size... BB Image...

Frame Rate Preset
54000
10 ~ 54210
BOOST OFF

Frame Size Preset
1280 x 896
Width: 336 ~ 1280
Height: 16 ~ 896

Shutter
OPEN
Custom (nsec) 18018
~ 18018
Auto Exposure OFF
Area FULL
Level MID

Trigger Timing
CENTER
Custom (%) 0
Custom (frame) 0

■◎ Recording Setting

■Items that Can Be Set From BB

Select the BB tab shown after selecting the recording settings tab icon to change the settings.
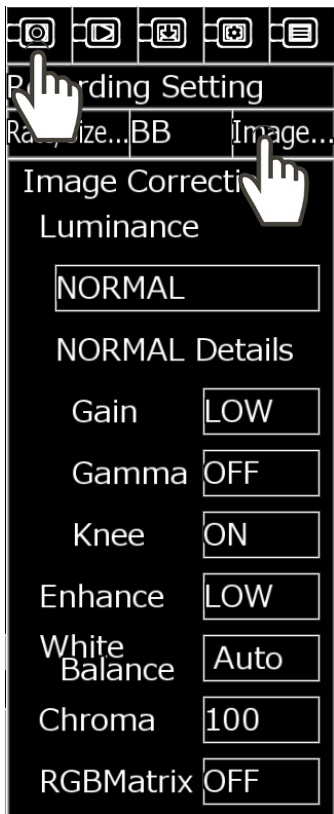
Setting	Details	⏩📖
Calculate BB	Get the black balance	4-42
Apply at Live	Apply to live image	
Apply at Play	Apply to play image	
Auto BB Calculation	Setting to get the auto black balance	
Starting Live	Execute after starting Auto BB VIEW	
Starting ARM	Execute after starting Auto BB ARM	
Rec Completed	Execute after ending Auto BB recording	4-43
Frame Rate / Size Changed	Execute after changing the Auto BB frame rate and frame size	
Power On	Execute after starting the Auto BB camera	
Low Light Changed	Execute after changing the Auto BB Low-Light	

Recording

 Recording Setting

■Items that Can Be Set From Image...

Select the Image... tab shown after selecting the recording settings tab icon to change the settings
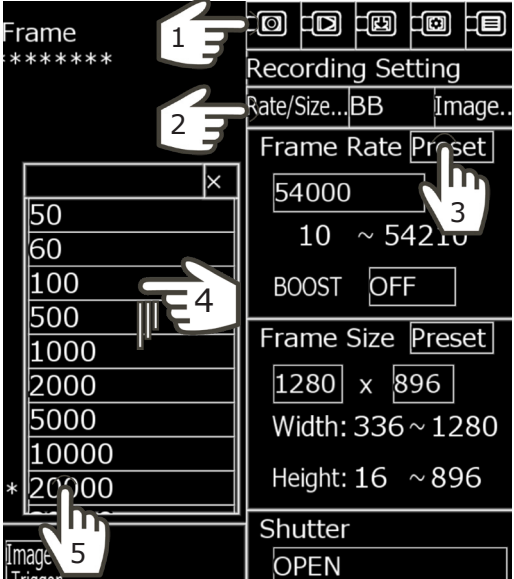
	Setting			Details	▸▭
	Luminance		Luminance	Luminance	
Image Correction	NORMAL Details	Gain	Gain	Gain	4-44 4-45 4-46
		Gamma	Gamma	Gamma	
		Knee	Knee	Knee	
		Enhance	Enhance	Enhance	
		White Balance	White Balance	White balance	
		Chroma	Chroma	Chroma	
		RGBMatrix	RGBMatrix	RGB matrix	

Select the Frame Rate

Select the frame rate (number of frames recorded per second).

■ Select the Frame Rate

Set the frame rate (number of frames recorded per second) matching the action and subject to be photographed.

■◉	1	Select the recording settings tab icon
Rate/Size...	2	Select the Rate/Size...box
Preset	3	Select from among the preset numbers in the box for the Frame Rate •A popup window is displayed
	4	Scroll through the popup window
	5	Select an item in the popup window •The speeds that can be selected are those found under the frame rate •Shrink the frame size to select outside this range (⇥ 🕮 4-7)

CHECK
•See (⇥ 🕮 4-6) for recording at frame rates that are not preset.
•The frame rate that can be set varies according to the frame size.
•The frame rate can be changed to correspond to the frame size.
•To set the frame rate at the upper limit, decrease the vertical size of the frame size.

4-5

Customize the Frame Rate
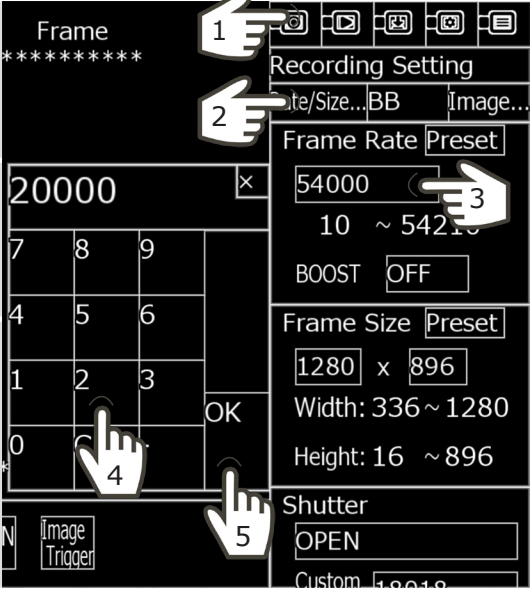
In addition to selecting from the presets, any frame rate can be set.

■ Customize the Frame Rate

If the frame rate is increased, the maximum frame size that can be set decreases.

If the frame size is increased, the maximum frame rate that can be set decreases.

Here is a description of the procedures for when setting the frame rate as a priority.

■□◎	1	Select the recording settings tab icon
Rate/Size...	2	Select the Rate/Size...box
Custom	3	Select a custom number for the frame rate •A keypad is displayed
	4	Input the numbers on the keypad •Input the numbers in increments of 10 Ex.10, 20, 30, 40, 50, 60, 70, 1010 •The frame rates that can be selected are in the box below •Shrink the frame size to select outside this range. (▸▥ 4-7)
	5	Select OK
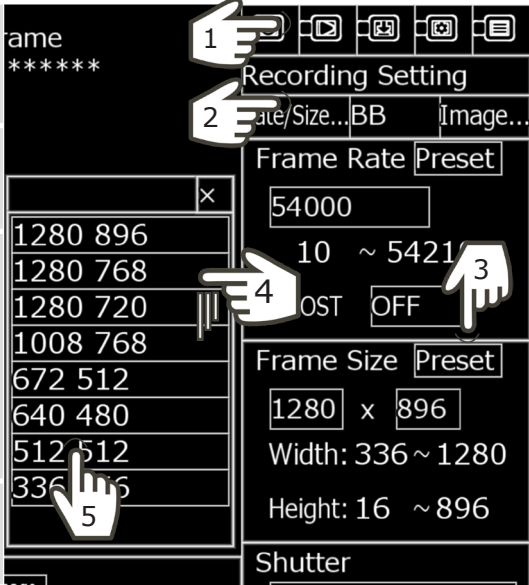
CHECK •The frame rate that can be set is in increments of 10 frames/sec.

Select the Frame Size

Select the frame size (valid pixels). If the frame size is decreased, the recording time will be longer. If the frame size is increased, the resolution will be higher and a wider range (angle of view) can be recorded.

■Select the Frame Size

Set the frame size (valid pixels)

■[◎]	1	Select the recording settings tab icon
Rate/Size...	2	Select the Rate/Size...box
Preset	3	Select from among the preset numbers in the box for the Frame Size •A popup window is displayed
	4	Scroll through the popup window
	5	Select an item in the popup window •The frame sizes that can be selected are those found under the frame size •Shrink the frame rate to select outside this range. (▸▯ 4-5)

CHECK
•See (▸▯ 4-8) for recording at frame sizes that are not preset.
•The frame size that can be set varies according to the frame rate.
•The frame size can be changed to correspond to the frame rate.
•To set the frame size at the upper limit, decrease the frame rate.
•See (▸▯ 10-2) for the valid image area size on the sensor.
•For details on frame rate, frame size and recording time, refer to the attached sheet "ACS-1 Preset Tables".

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Customize the Frame Size
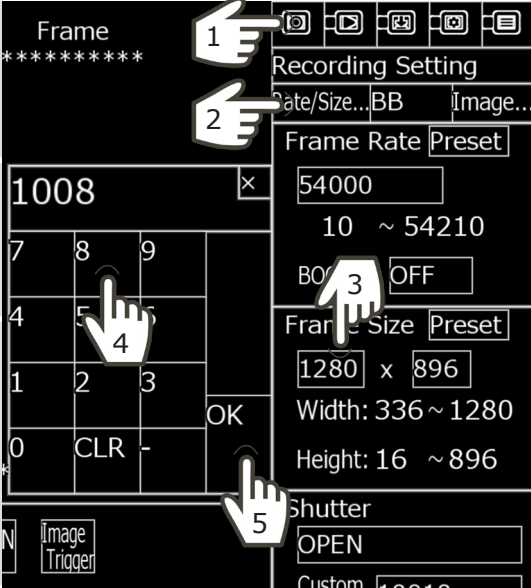
In addition to selecting from the presets, any frame size can be set.

■Customize the Frame Size

If the frame rate is increased, the maximum frame size that can be set decreases.

If the frame size is increased, the maximum frame rate that can be set decreases.

Here is a description of the procedures for when setting the frame size as a priority.

▪◉	1	Select the recording settings tab icon	
Rate/Size...	2	Select the Rate/Size...box	
Custom	3	Select a custom number for the frame size •A keypad is displayed	
	4	Input the numbers on the keypad •Input the numbers in multiples of 16 　　Ex.400, 416, 432, 1264 •The frame sizes that can be selected are in the box below •Shrink the frame rate to select outside this range (▸▥ 4-5)	
	5	Select OK	

Minimum and maximum setting values that can be set by custom.

	Minimum setting value	Maximum setting value
Horizontal pixels	336	1280
Vertical pixels	16	896

•The frame size that can be set is in 16 horizontal pixels and 16 vertical pixels.

⭐CHECK　•See (▸▥ 10-2) for the valid image area size on the sensor.

•For details on frame rate, frame size and recording time, refer to the attached sheet "ACS-1 Preset Tables".

Frame Rate and Frame Size ACS-1E

The frame size that can be set varies according to the recording mode settings, and the frame rate.

Frame Rate	Frame Size that Can Be Selected				
50 to 35,000	1280 × 896	1280 × 720	1008 × 768	672 × 512	640 × 480
	512 × 512	336 × 256			
40,000	1280 × 800	1280 × 720	1008 × 768	672 × 512	640 × 480
	512 × 512	336 × 256			
45,000	1280 × 720	1008 × 720	672 × 512	640 × 480	512 × 512
	336 × 256				
50,000	1280 × 640	1280 × 576	1008 × 640	672 × 576	672 × 512
	640 × 480	512 × 512	336 × 256		
60,000	1280 × 528	1008 × 528	672 × 512	640 × 480	512 × 512
	336 × 256				
65,000	1280 × 480	1280 × 448	1008 × 480	672 × 480	672 × 448
	640 × 480	336 × 256			
75,000	1280 × 400	1008 × 400	672 × 400	336 × 256	
100,000	1280 × 288	1008 × 288	672 × 288	336 × 256	
120,000	1280 × 224	1280 × 192	1008 × 224	672 × 224	336 × 224
	336 × 192				
200,000	1280 × 112	1280 × 96	1280 × 64	1008 × 112	672 × 112
	336 × 112				
220,000	1280 × 96	336 × 96			

4-9

Frame Rate and Frame Size ACS-1

The frame size that can be set varies according to the recording mode settings, and the frame rate.

Frame Rate	Frame Size that Can Be Selected				
50 to 35,000	1280 × 896	1280 × 720	1008× 768	672 x 512	768 × 576
	512 × 512	640 × 480	336 × 256		
40,000	1280 × 800	1280 × 720	1008 × 768	672 x 512	512 × 512
	640 × 480	336 × 256			
45,000	1280 × 720	1008 × 720	672 × 512	512 × 512	640 × 480
	336 × 256				
50,000	1280 × 640	1280 x 576	1008 x 640	672 x 576	672 x 512
	512 × 512	640 x 480	336 x 256		
60,000	1280 × 528	1008 x 528	1008 x 528	672 x 512	512 × 512
	640 x 480	336 × 256			
65,000	1280 × 480	1280 x 448	1008 x 480	672 x 448	672 x 480
	640 × 480	336 × 256			
75,000	1280 × 400	1008 x 288	672 × 400	336 × 256	
100,000	1280 × 288	1008 × 288	672 × 288	336 × 256	
120,000	1280 × 224	1008 × 224	672 × 224	336 × 224	
200,000	1280 × 112	1280 x 96	1280 x 64	1008 x 112	672 x 112
	336 x 112	336 x 96	336 x 64		
300,000	1280 × 48	336 × 48			
400,000	1280 × 32	336 × 32			
500,000	1280 × 16	336 × 16			
540,000	1280 × 16	336 × 16			

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Frame Rate and Frame Size ACS-1 M60E

The frame size that can be set varies according to the recording mode settings, and the frame rate.

Frame Rate	Frame Size that Can Be Selected				
50 to 54,000	1280 × 896	1280 × 768	1280 × 720	1008× 768	672 x 512
	512 × 512	640 × 480	336 × 256		
60,000	1280 × 800	1280 × 768	1280 × 720	1008 × 768	672 x 512
	512 × 512	640 × 480	336 × 256		
65,000	1280 x 736	1280 x 720	1280 x 704	1280 x 640	1008 x 736
	672 x 640	672 x 512	512 x 512	640 x 480	336 x 256
75,000	1280 x 624	1280 x 544	1008 x 624	672 x 544	672 x 512
	512 x 512	640 x 480	336 x 256		
100,000	1280 x 448	1280 x 384	1280 x 352	1008 x 448	672 x 384
	672 x 448	672 x 352	336 x 256		
150,000	1280 x 272	1008 x 272	672 x 272	336 x 256	
200,000	1280 x 192	1008 x 192	672 x 192	336 x 192	
220,000	1280 x 176	1008 x 176	672 x 176	336 x 176	

Recording

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Frame Rate and Frame Size ACS-1 M60

The frame size that can be set varies according to the recording mode settings, and the frame rate.

Frame Rate	Frame Size that Can Be Selected				
50 to 54,000	1280 × 896	1280 × 768	1280 × 720	1008× 768	672 x 512
	512 × 512	640 × 480	336 × 256		
60,000	1280 × 800	1280 × 768	1280 × 720	1008 × 768	672 x 512
	512 × 512	640 × 480	336 × 256		
65,000	1280 x 736	1280 x 720	1008 x 736	672 x 512	512 x 512
	640 x 480	336 x 256			
75,000	1280 x 624	1280 x 544	1008 x 624	672 x 544	672 x 512
	512 x 512	640 x 480	336 x 256		
100,000	1280 x 448	1280 x 384	1008 x 448	672 x 384	672 x 448
	336 x 256				
150,000	1280 x 272	1008 x 272	672 x 272	336 x 256	
200,000	1280 x 192	1280 x 128	1008 x 192	672 x 192	336 x 192
	336 x 128				
300,000	1280 x 96	1280 x 64	1008 x 96	672 x 96	336 x 96
	336 x 64				
400,000	1280 x 48	336 x 48			
500,000	1280 x 32	336 x 32			
700,000	1280 x 16	336 x 16			
1,000,000	1280 x 16	336 x 16			

Frame Rate and Frame Size ACS-1 M40E

The frame size that can be set varies according to the recording mode settings, and the frame rate.

Frame Rate	Frame Size that Can Be Selected				
50 to 35,000	1280 x 896	1280 x 720	1008 x 768	672 x 512	512 x 512
	640 x 480	336 x 256			
40,000	1280 x 800	1280 x 720	1008 x 768	672 x 512	512 x 512
	640 x 480	336 x 256			
45,000	1280 x 720	1280 x 704	1008 x 720	672 x 512	512 x 512
	640 x 480	336 x 256			
50,000	1280 x 640	1280 x 576	1008 x 640	672 x 576	672 x 512
	512 x 512	640 x 480	336 x 256		
60,000	1280 x 528	1008 x 528	672 x 512	512 x 512	640 x 480
	336 x 256				
65,000	1280 x 480	1280 x 448	1008 x 480	672 x 448	672 x 480
	640 x 480	336 x 256			
75,000	1280 x 400	1280 x 384	1008 x 400	672 x 400	672 x 384
	336 x 256				
100,000	1280 x 288	1008 x 288	672 x 288	336 x 256	
120,000	1280 x 224	1280 x 192	1008 x 224	672 x 224	336 x 224
	336 x 192				
200,000	1280 x 112	1280 x 96	1280 x 64	1008 x 112	672 x 112
	336 x 112				
220,000	1280 x 96	336 x 96			

Frame Rate and Frame Size ACS-1 M40

The frame size that can be set varies according to the recording mode settings, and the frame rate.

Frame Rate	Frame Size that Can Be Selected				
50 to 35,000	1280 x 896	1280 x 720	1008 x 768	672 x 512	512 x 512
	640 x 480	336 x 256			
40,000	1280 x 800	1280 x 720	1008 x 768	672 x 512	512 x 512
	640 x 480	336 x 256			
45,000	1280 x 720	1280 x 704	1008 x 720	672 x 512	512 x 512
	640 x 480	336 x 256			
50,000	1280 x 640	1280 x 576	1008 x 640	672 x 576	672 x 512
	512 x 512	640 x 480	336 x 256		
60,000	1280 x 528	1008 x 528	672 x 512	512 x 512	640 x 480
	336 x 256				
65,000	1280 x 480	1280 x 448	1008 x 480	672 x 448	672 x 480
	640 x 480	336 x 256			
75,000	1280 x 400	1008 x 400	672 x 400	336 x 256	
100,000	1280 x 288	1008 x 288	672 x 288	336 x 256	
120,000	1280 x 224	1280 x 192	1008 x 224	672 x 224	336 x 224
	336 x 192				
150,000	1280 x 176	1280 x 128	1008 x 176	672 x 176	336 x 176
	336 x 128				
200,000	1280 x 112	1280 x 96	1280 x 64	1008 x 112	672 x 112
	336 x 112	336 x 96	336 x 64		
300,000	1280 x 48	336 x 48			
400,000	1280 x 32	336 x 32			
500,000	1280 x 16	336 x 16			
700,000	1280 x 16	336 x 16			

Frame Rate and Frame Size ACS-1 M30E

The frame size that can be set varies according to the recording mode settings, and the frame rate.

Frame Rate	Frame Size that Can Be Selected				
50 to 25,000	1280 x 896	1280 x 720	1008 x 768	672 x 512	512 x 512
	640 x 480	336 x 256			
27,000	1280 x 896	1280 x 832	1280 x 720	1008 x 768	672 x 512
	512 x 512	640 x 480	336 x 256		
30,000	1280 x 800	1280 x 736	1280 x 720	1008 x 768	672 x 672
	512 x 512	640 x 480	336 x 256		
35,000	1280 x 704	1280 x 672	1280 x 640	1008 x 768	672 x 512
	672 x 640	672 x 512	512 x 512	640 x 480	336 x 256
40,000	1280 x 592	1280 x 576	1008 x 592	672 x 576	672 x 512
	512 x 512	640 x 480	336 x 256		
45,000	1280 x 528	1008 x 528	672 x 512	336 x 256	
50,000	1280 x 464	1280 x 448	1280 x 416	1008 x 464	672 x 464
	672 x 448	672 x 416	336 x 256		
60,000	1280 x 368	1008 x 368	672 x 368	336 x 256	
65,000	1280 x 336	1280 x 320	1008 x 336	672 x 336	336 x 336
	336 x 320	336 x 256			
75,000	1280 x 288	1280 x 256	1280 x 224	1008 x 288	672 x 288
	672 x 224	336 x 256			
100,000	1280 x 208	1280 x 192	1280 x 128	1008 x 208	672 x 208
	336 x 208	336 x 192	336 x 128		
120,000	1280 x 160	1008 x 160	672 x 160	336 x 160	
150,000	1280 x 112	1280 x 96	1008 x 112	672 x 112	336 x 112
	336 x 96				
200,000	1280 x 64	336 x 64			
220,000	1280 x 48	336 x 48			

Frame Rate and Frame Size ACS-1 M30

The frame size that can be set varies according to the recording mode settings, and the frame rate.

Frame Rate	Frame Size that Can Be Selected				
50 to 25,000	1280 x 896	1280 x 720	1008 x 768	672 x 512	512 x 512
	640 x 480	336 x 256			
27,000	1280 x 896	1280 x 832	1280 x 720	1008 x 768	672 x 512
	512 x 512	640 x 480	336 x 256		
30,000	1280 x 800	1280 x 736	1280 x 720	1008 x 768	672 x 512
	512 x 512	640 x 480	336 x 256		
35,000	1280 x 704	1280 x 672	1280 x 640	1008 x 704	672 x 672
	672 x 640	672 x 512	512 x 512	640 x 480	336 x 256
40,000	1280 x 592	1280 x 576	1008 x 592	672 x 576	672 x 512
	512 x 512	640 x 480	336 x 256		
45,000	1280 x 528	1008 x 528	672 x 512	336 x 256	
50,000	1280 x 464	1280 x 448	1280 x 416	1008 x 464	672 x 464
	672 x 448	672 x 416	336 x 256		
60,000	1280 x 368	1008 x 368	672 x 368	336 x 256	
65,000	1280 x 336	1280 x 320	1008 x 336	672 x 336	336 x 336
	336 x 320	336 x 256			
75,000	1280 x 288	1280 x 256	1280 x 224	1008 x 288	672 x 288
	672 x 224	336 x 256			
100,000	1280 x 208	1280 x 192	1280 x 128	1008 x 208	672 x 208
	336 x 208	336 x 192	336 x 128		
120,000	1280 x 160	1008 x 160	672 x 160	336 x 160	
150,000	1280 x 112	1280 x 96	1008 x 112	672 x 112	336 x 112
	336 x 96				
200,000	1280 x 64	336 x 64			
250,000	1280 x 48	336 x 48			
300,000	1280 x 32	336 x 32			
400,000	1280 x 16	336 x 16			
500,000	1280 x 16	336 x 16			

Boost mode

Increase Frame Rate or vertical resolution

■Boost mode

A function that can increase the Frame Rate or vertical resolution compared to the normal mode.(➠📖 4-19)

■Boost 4 Mode

A function that increases the shooting speed or vertical resolution compared to boost mode. This function is enabled depending on the supported camera.

CHECK •Boost 4 mode is supported by ACS-1 M60/M60E/M40/M40E shipped after July 2021.

M60E and M60 are compatible from serial number 2100

M40E and M40 are compatible from serial number 3100

•Please contact us or distributors for Boost 4 mode support.

•ACS-1 M30/M30E does not have a boost 4 mode.
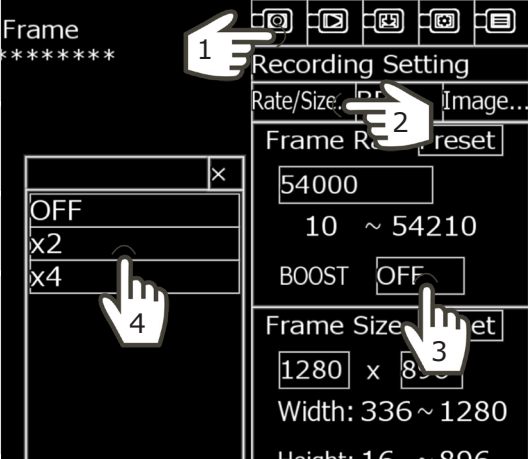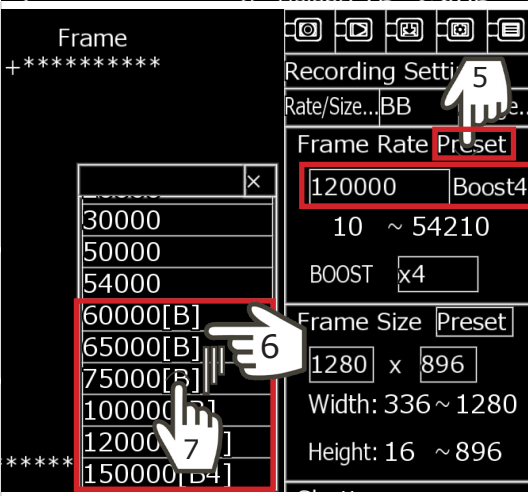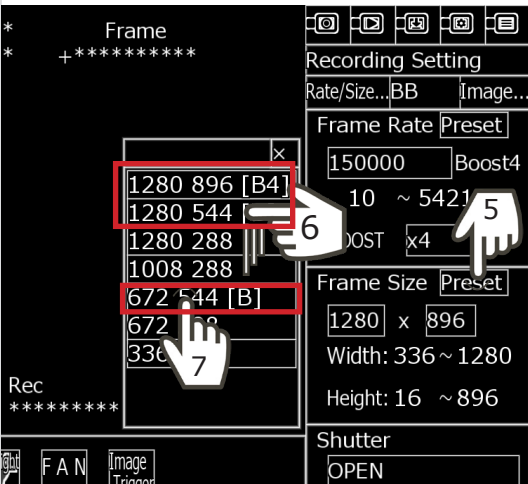
Attention •Boost mode and Boost 4 mode supports only Mono, not color.

•Boost and Boost 4 modes are presets only, no custom frame rate or custom frame size can be set.

•The following functions cannot be used at the same time

Recording method （➠📖 7-19 ）

BURST, BURST(A), BURST(L), MULTI1(A), MULTI1(C), MULTI3(A), MULTI3(C), LINEAR

Variable Frame Rate （➠📖 7-38 ）

Trigger reset （➠📖 7-26 ）

Frame Straddling （➠📖 7-41 ）

4-17

Select Frame Rate and Frame Size in Boost mode

Selecting Boost Settings [ON] adds the frame rate for Boost mode operation to the frame rate preset.

■Select Frame Rate in Boost mode

Set the Frame Rate (number of recorded frames per second) according to the phenomenon or subject to be shot.

	1	Select the recording settings tab icon
Rate/Size...	2	Select the Rate/Size...box
BOOST	3	Select inside the BOOST
BOOST	4	Select 'x2' or 'x4' in the BOOST item x2 Boost mode x4 Boost 4 mode (including boost mode)
Preset	5	•To change the recording speed Select the Preset of the Frame Rate •To change the frame size Select the Preset of the Frame Size •Popup window display
	6	Scroll through the popup window
	7	Select an item in the popup window •The item will be displayed as [B] or [B4] depending on the supported mode. •The Frame Rate in the normal mode is displayed in the lower FrameRate description range (10 to 54210 in the right figure). By turning on the Boost mode, the recording speed exceeding the specified range can be selected. *Selecting the frame rate and frame size that can be selected by turning on the Boost mode displays "Boost'" next to the selected frame rate.

4-18

Frame Rate and Frame Size ACS-1E

ACS-1E Boost mode

Frame Rate	Frame Size that Can Be Selected	
40,000 45,000 50,000 60,000 65,000	1280 × 896	
75,000	1280 × 800	
100,000	1280 × 576	672 × 576
120,000	1280 × 448	672 × 448
200,000	1280 × 224	336 × 224
220,000	1280 × 192	336 × 192

Recording

4-19

Frame Rate and Frame Size ACS-1

ACS-1 Boost mode

Frame Rate	Frame Size that Can Be Selected	
40,000 45,000 50,000 60,000 65,000	1280 × 896	
75,000	1280 × 800	
100,000	1280 × 576	672 × 576
120,000	1280 × 448	672 × 448
200,000	1280 × 224	336 × 224
300,000	1280 × 96	336 × 96
400,000	1280 × 64	336 × 64
500,000	1280 × 32	336 × 32
540,000	1280 × 32	336 × 32

Frame Rate and Frame Size ACS-1 M60E

ACS-1 M60E Boost mode

Frame Rate	Frame Size that Can Be Selected	
60,000 65,000 75,000 100,000	1280 × 896	
120,000	1280 x 704	
150,000	1280 x 544	672 x 544
200,000	1280 x 384	672 x 384
220,000	1280 x 352	672 x 352

ACS-1 M60E Boost 4 mode

Frame Rate	Frame Size that Can Be Selected	
120,000 150,000	1280 x 896	
200,000	1280 x 768	
220,000	1280 x 640	672 x 640

Recording

4-21

Frame Rate and Frame Size ACS-1 M60

ACS-1 M60 Boost mode

Frame Rate	Frame Size that Can Be Selected	
60,000 65,000 75,000 100,000	1280 × 896	
120,000	1280 × 704	
150,000	1280 x 544	672 x 544
200,000	1280 x 384	672 x 384
300,000	1280 x 192	336 x 192
400,000	1280 x 96	336 x 96
500,000	1280 x 64	336 x 64
700,000	1280 x 32	336 x 32
1,000,000	1280 x 32	336 x 32

ACS-1 M60 Boost 4 mode

Frame Rate	Frame Size that Can Be Selected	
120,000 150,000	1280 × 896	
200,000	1280 × 768	
300,000	1280 x 384	672 x 384
400,000	1280 x 192	336 x 192
500,000	1280 x 128	336 x 128
700,000	1280 x 64	336 x 64

Frame Rate and Frame Size ACS-1 M40E

ACS-1 M40E Boost mode

Frame Rate	Frame Size that Can Be Selected	
40,000 45,000 50,000 60,000 65,000	1280 × 896	
75,000	1280 × 800	
100,000	1280 × 576	672 × 576
120,000	1280 × 448	672 × 448
150,000	1280 × 352	672 × 352
200,000	1280 × 224	336 × 224
220,000	1280 × 192	336 × 192

ACS-1 M40E Boost 4 mode

Frame Rate	Frame Size that Can Be Selected	
75,000 100,000 120,000	1280 × 896	
150,000	1280 × 704	
200,000	1280 × 448	672 × 448
220,000	1280 × 384	672 × 384

Recording

(00457)H

Frame Rate and Frame Size ACS-1 M40

ACS-1 M40 Boost mode

Frame Rate	Frame Size that Can Be Selected	
40,000 45,000 50,000 60,000 65,000	1280 × 896	
75,000	1280 × 800	
100,000	1280 × 576	672 × 576
120,000	1280 × 448	672 × 448
150,000	1280 × 352	672 × 352
200,000	1280 × 224	336 × 224
300,000	1280 × 96	336 × 96
400,000	1280 × 64	336 × 64
500,000	1280 × 32	336 × 32
700,000	1280 × 32	336 × 32

ACS-1 M40 Boost 4 mode

Frame Rate	Frame Size that Can Be Selected	
75,000 100,000 120,000	1280 × 896	
150,000	1280 × 704	
200,000	1280 × 448	672 × 448
300,000	1280 × 192	336 × 192
400,000	1280 × 128	336 × 128
500,000	1280 × 64	336 × 64
700,000	1280 × 64	336 × 64

Frame Rate and Frame Size ACS-1 M30E

ACS-1 M30E Boost mode

Frame Rate	Frame Size that Can Be Selected	
30,000 35,000 40,000 45,000 50,000	1280 × 896	
60,000	1280 x 736	
65,000	1280 x 672	672 x 672
75,000	1280 x 576	672 x 576
100,000	1280 × 416	672 × 416
120,000	1280 × 320	336 × 320
150,000	1280 × 224	336 × 224
200,000	1280 × 128	336 × 128
220,000	1280 × 96	336 × 96

Recording

4-25

Frame Rate and Frame Size ACS-1 M30
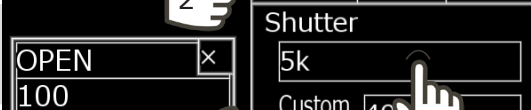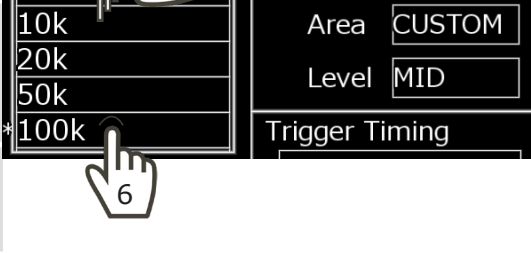
ACS-1 M30 Boost mode

Frame Rate	Frame Size that Can Be Selected	
30,000 35,000 40,000 45,000 50,000	1280 × 896	
60,000	1280 × 736	
65,000	1280 × 672	672 × 672
75,000	1280 × 576	672 × 576
100,000	1280 × 416	672 × 416
120,000	1280 × 320	336 × 320
150,000	1280 × 224	336 × 224
200,000	1280 × 128	336 × 128
250,000	1280 × 96	336 × 96
300,000	1280 × 64	336 × 64
400,000	1280 × 32	336 × 32
500,000	1280 × 32	336 × 32

Select the Shutter Speed

Select the shutter speed. It is also possible to customize the shutter speed with a numerical input.

■ Select the Shutter Speed from a Preset

▪◉	1	Select the recording settings tab icon
Rate/Size...	2	Select the Rate/Size...box
Shutter	3	Scroll through the window under the Rate/Size..tab •Shutter is displayed
	4	Make a selection inside the Shutter box •A popup window is displayed
	5	Scroll through the popup window to show the target items
	6	Select OK

Shutter Speeds that Can Be Selected

Preset Shutter Speeds ACS-1	1/100, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,000, 1/500,000 s , OPEN

⚠ Attention •Depending on the frame rate, there may be an upper limit for the shutter speed.
•OPEN refers to the maximum at that frame rate.

■ Customize a Shutter Speed

	1	Select CUSTOM from the preset shutter speeds
Custom (nsec)	2	Make a selection in the box to the right of CUSTOM(nsec) •A keypad is displayed
	3	Input the numbers on the keypad •The value of the upper limit that can be input is indicated below the box
	4	Select OK
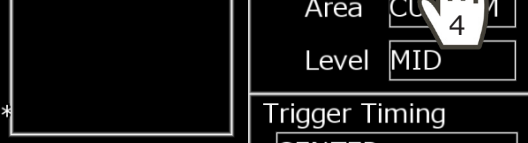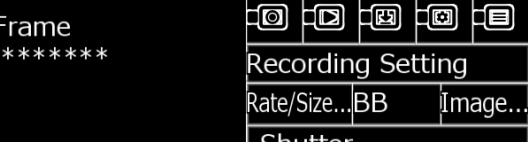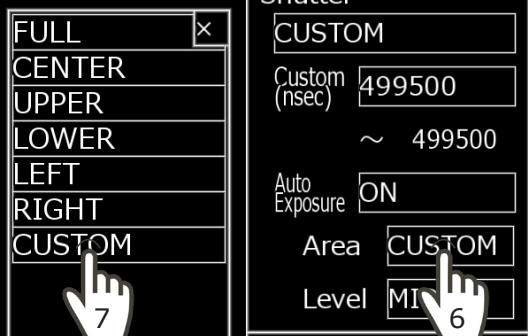
Attention • Depending on the frame rate, there may be an upper limit for the shutter speed.

• The shutter speed that can be set is in units of 100nsec.
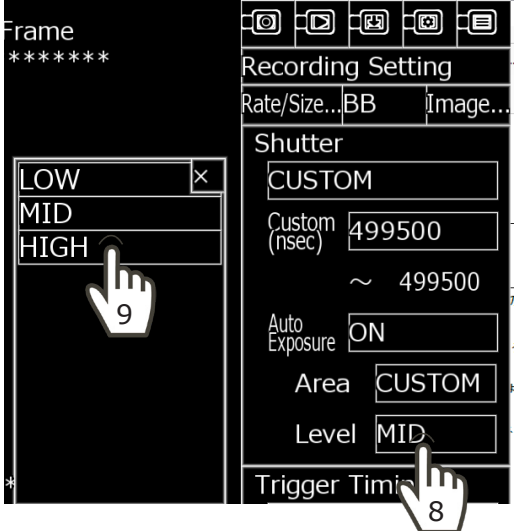
Use Auto Exposure Control

Automatic Exposure Control (AEC) performs photometry of a specified area of an image photographed, and automatically adjusts the shutter speed so the image has the proper brightness. When recording outside, it is used when the brightness of the surroundings change, such as changes due to clouds, time or the atmosphere.

■ Set the Automatic Exposure Control

To use the automatic exposure control, set the adjustment level of the automatic exposure control (AEC) and the photometry area (AOI).

(icon)	1	Select the recording settings tab icon
Rate/Size...	2	Select the Rate/Size...box
Shutter	3	Scroll through the window under the Rate/Size..tab •Shutter is displayed
Auto Exposure	4	Make a selection to the right of the Auto Exposure box •A popup window is displayed
	5	Select an item in the popup window
Area	6	Make a selection to the right of the Area box •A popup window is displayed
	7	Select an item in the popup window •FULL •CENTER •UPPER •LOWER •LEFT •RIGHT •CUSTOM

Recording

4-29

Level	8	Make a selection to the right of the Level box •A popup window is displayed	
	9	Select an item in the popup window •LOW: Adjusts so the average luminance is low. •MID: Adjusts so the average luminance is medium. •HIGH: Adjusts so the average luminance is high.	

Attention •The response speed for the auto exposure can be set to a delay. This is not suitable for photographing abrupt changes in brightness such as when a strobe light goes off or during an explosion.

•If using the auto exposure control, the shutter speed is adjusted 10 microseconds after the exposure time set with the SHUTTER item. The adjusted value of the shutter speed for the recorded frame is recorded for each frame.

•This cannot be used at the same time as the image trigger function.

•The photometry area of the auto exposure control has the same settings as the photometry area (AOI) of the image trigger.

•About Image Trigger.(➡ 📖 4-38)

Set the Trigger Timing

Set the trigger timing to match the action photographed.

The count of frames until the trigger is input as well as the percentage of frames recorded after trigger input are determined by the trigger timing. The following 4 types of trigger timing are available.

- •Start trigger (START)
- •Center trigger (CENTER)
- •End trigger (END)
- •Custom trigger (+000%)

Start Trigger

With the start trigger, it is possible to record the frame count that corresponds to 95% of the recording time from trigger input to the end of recording.

The setting is enabled when recording an action that occurs immediately after the trigger is input.
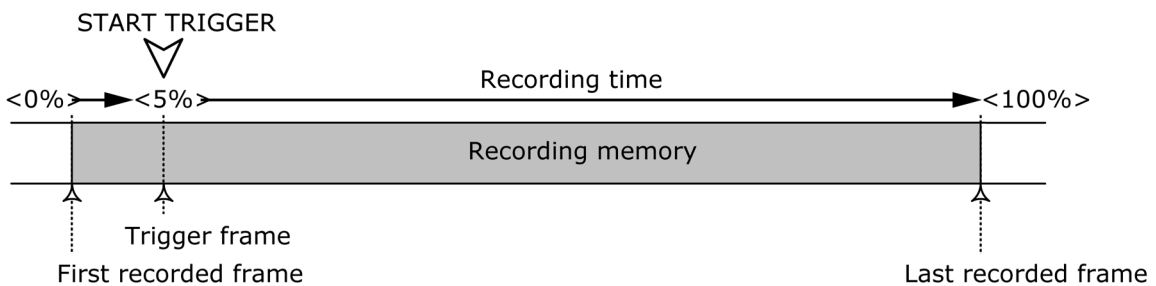
Center Trigger

With the center trigger, it is possible to record the frame count so half of the recording time is both before and after the trigger input.

The setting is enabled when recording an action that occurs immediately before and after the trigger is input.

4-31
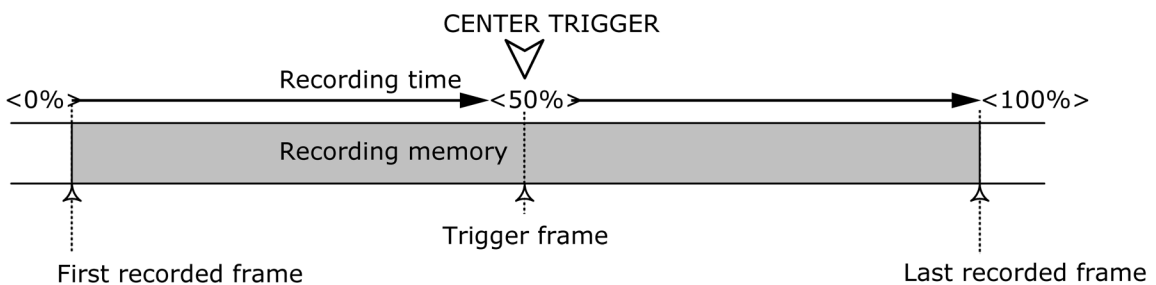
End Trigger

With the end trigger, it is possible to record the frame count that corresponds to 95% of the recording time from the beginning of recording to trigger input.

The setting is enabled when recording so that the trigger is input after the action has ended.

END TRIGGER

Recording time
<0%>——————————————————————<95%>—►<100%>

Recording memory

Trigger frame

First recorded frame   Last recorded frame
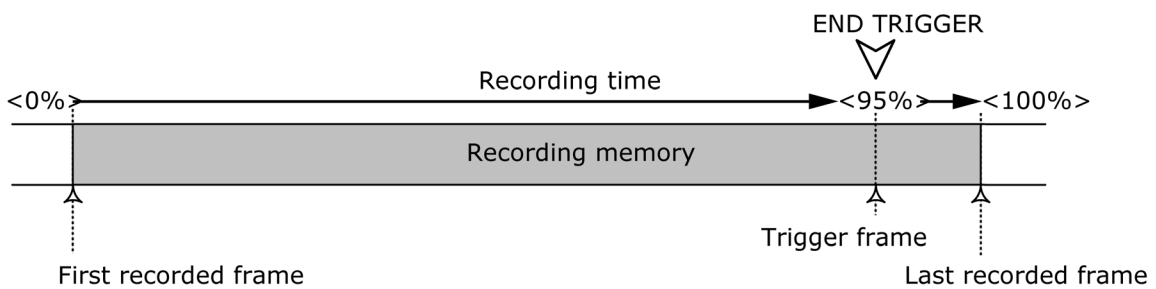
Custom Trigger (Specify the %)

With the custom trigger, if a positive number is set, it is possible to set the frame count to record from the start of recording to the trigger input and the frame count to record from the trigger input to the end of recording in your desired proportion (1% increments).

The example in the diagram is for when the trigger timing is set at +25%.

CUSTOM TRIGGER

Recording memory
<0%>————►<25%>——————————————————►<100%>

Recording memory

Trigger frame

First recorded frame   Last recorded frame

4-32
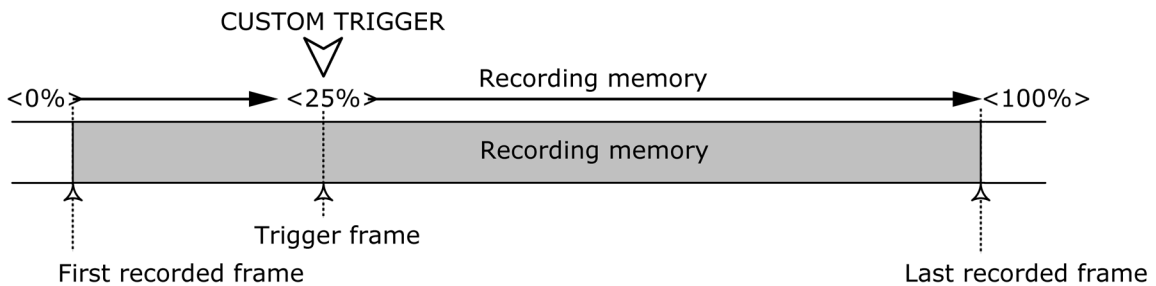
Additionally, if set to a negative number, it will function as a delayed trigger (recording starts a certain amount of time after trigger input). For example, if the trigger timing is set to -100%, after the trigger input, recording will start when the same time as the possible recording time has elapsed.

CUSTOM TRIGGER

Recording time

<-100%>   <0%>   <100%>

Recording memory

First recorded frame   Last recorded frame
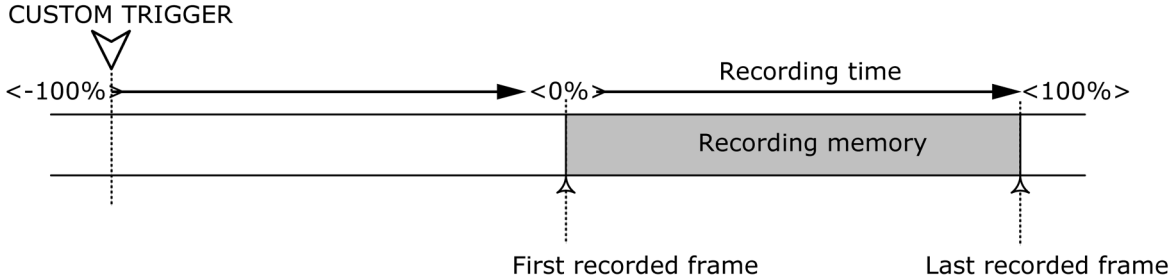
Custom Trigger (Specify the Frame Count)

With a custom trigger, if you set a positive value, you can set the count of frames recorded from the start of recording to the trigger input. The maximum count of frames that can be set is the count of recordable frames.

The example in the figure is when the trigger timing is +5000 frames.

CUSTOM TRIGGER

<0%> 5000 frame Recording time <100%>

Recording memory

Trigger frame

First recorded frame   Last recorded frame
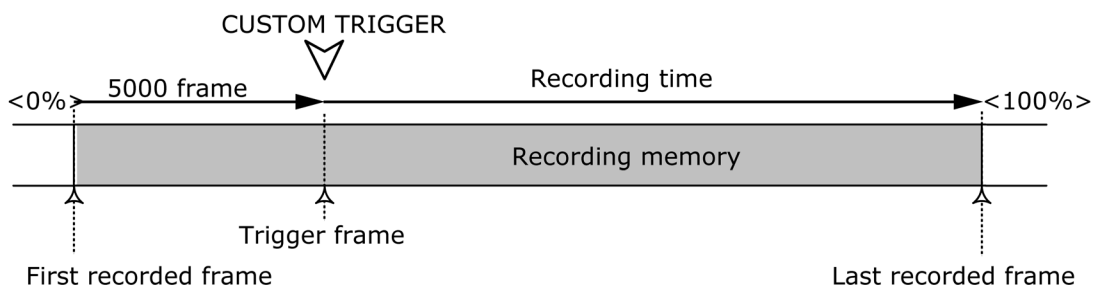
Additionally, if set to a negative number, it will function as a delayed trigger and it will be possible to set the count of frames (in 1 frame increments) from the trigger input to when the recording starts. The maximum value for the count of frames that can be set is the count of frames in 600 seconds, or 65536 frames, whichever is larger. For example, if the count of frames is set to -30000, after the trigger input, recording will start when the time for -30000 frames has elapsed.

CUSTOM TRIGGER

-30000 frame <0%> Recording time <100%>

Recording memory

First recorded frame   Last recorded frame
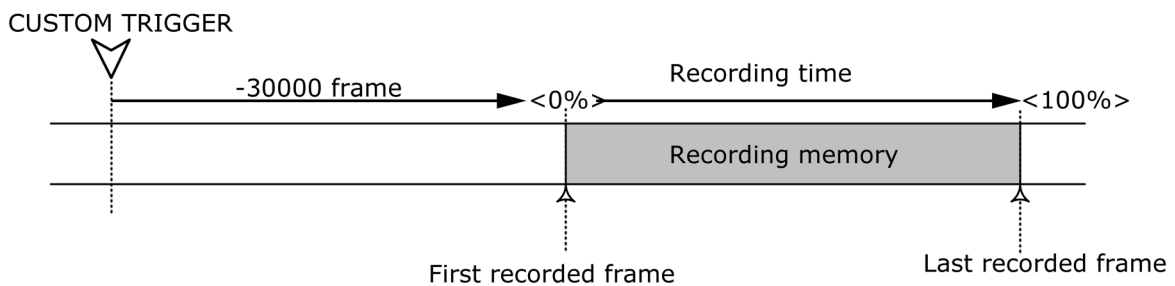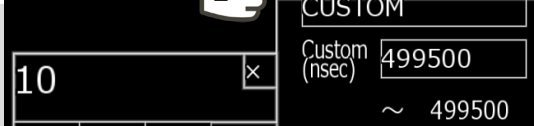
■Select the Trigger Timing

■ ◎	1	Select the recording settings tab icon
Rate/Size...	2	Select the Rate/Size...box
Trigger Timing	3	Scroll through the window under the Rate/Size..tab •Trigger Timing is displayed
	4	Make a selection under the Trigger Timing box •A popup window is displayed
	5	Select the item in the popup window •START Start trigger •CENTER Center trigger •END End trigger •CUSTOM Custom trigger

Frame
****

Recording Setting

Rate/Size...BB   Image..

CUSTOM

Custom (nsec) 499500

~   499500

Auto Exposure OFF

Area   CUSTOM

Level   MID

START   ×
CENTER
END
CUSTOM

Trigger Timing
CENTER

Custom (%) 0

Custom (frame) 0

Image Trigger
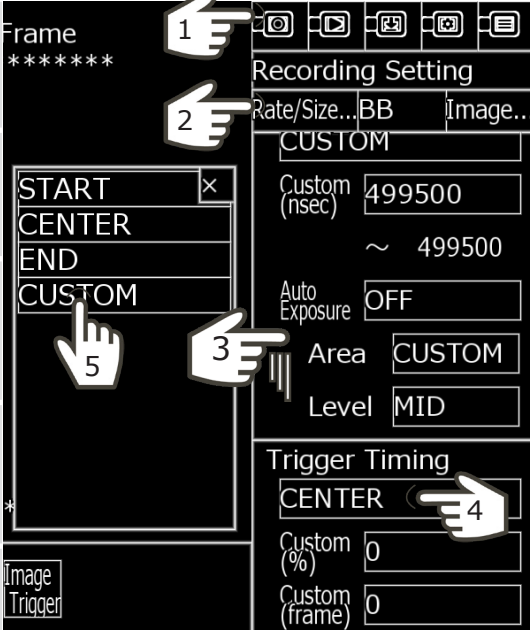
Recording

Set the Custom Trigger

■Set the Custom Trigger (Specify the %)

■□◉	1	Select the recording settings tab icon
Rate/Size...	2	Select the Rate/Size...box
Trigger Timing	3	Scroll through the window under the Rate/Size..tab •Trigger Timing is displayed
Custom (frame)	4	Make a selection under the Custom box •A keypad is displayed
Custom (%)	5	Input the numbers on the keypad •Input % (-100 to 100 %)
	6	Select OK

Frame
****

Recording Setting

Rate/Size.. BB   Image..

CUSTOM

Custom (nsec) 499500

~   499500

Auto Exposure OFF

Area   CUSTOM

Level MID

Trigger Timing

CUSTOM

Custom (%) 10

Custom (frame) 237

Image Trigger

7 8 9
4 5 6
1 2 3
C CLR -

10   ×

OK
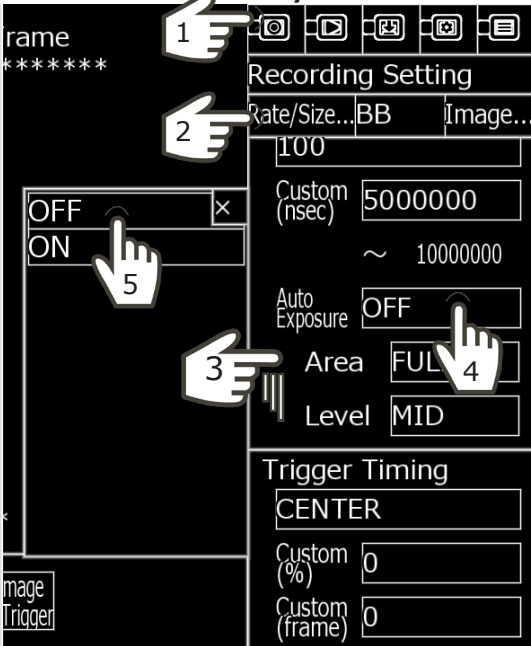
■Set the Custom Trigger (Specify the Frame Count)

■◎	1	Select the recording settings tab icon
Rate/Size...	2	Select the Rate/Size...box
Trigger Timing	3	Scroll through the window under the Rate/Size..tab •Trigger Timing is displayed
Custom (frame)	4	Make a selection under the Custom box •A keypad is displayed
Custom (%)	5	Input the numbers on the keypad •Input the frame count
	6	Select OK

Recording

4-37
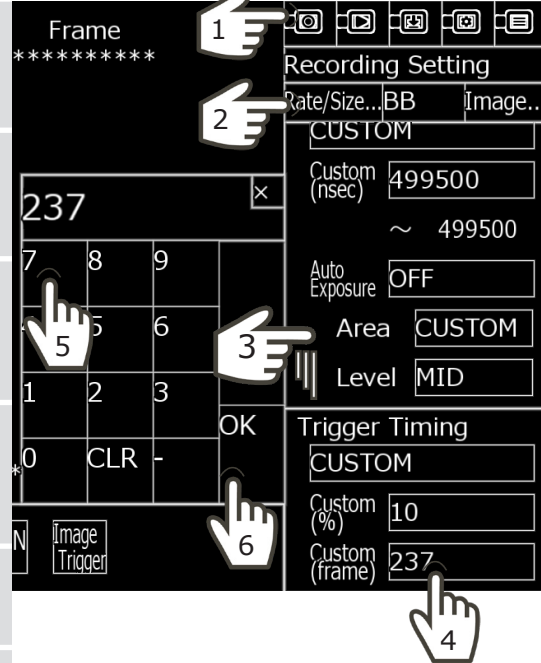
Use Image Trigger

■Setting the Image Trigger Detection Sensitivity

◼▣◉	1	Select the recording settings tab icon
Rate/Size...	2	Select the Rate/Size...box
	3	Rate/Size..Scroll window under tab
Auto Exposure	4	Select within Auto Exposure •Select the item in the popup window
	5	Turn off AE because it cannot be used concurrently with the Image Trigger function. *Even if the image trigger is enabled, if AE is ON, the AE setting takes precedence.
▶	6	Switch to VIEW mode. Click VIEW mode
Image Trigger	7	Click the ImageTrigger icon
Trigger	8	Select the Trigger tab frame and set the trigger detection sensitivity. OFF Do not use the image trigger function LOW : Trigger is triggered by a large change in brightnessis done. MID : A trigger is triggered by a medium brightness change. HIGH : A trigger is triggered by a slight change in brightness.

4-38

■Set image trigger detection criteria, detection size, and detection area(1/2)

Criterion	1	Select the Criterion tab frame and set the update method of the image trigger detection criteria. START Be based on the brightness at the time of shifting to ARM MANUAL Based on the brightness when the ARM button is pressed during ARM In the V-PAD, when the [SET] button at the bottom of this setting is pressed (the trigger detection size is set).	
Block Size	2	Select the Block Size tab and set the trigger detection size. Choice: SMALL/MEDIUM/LARGE	
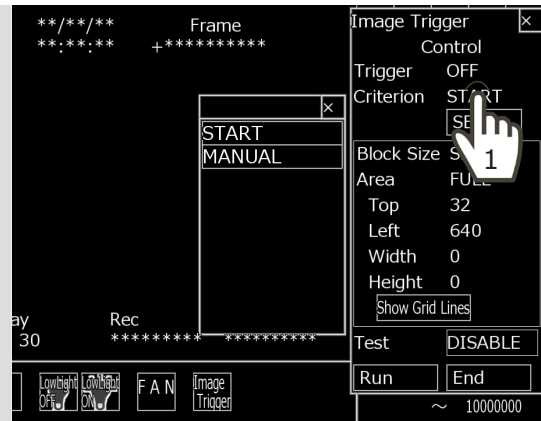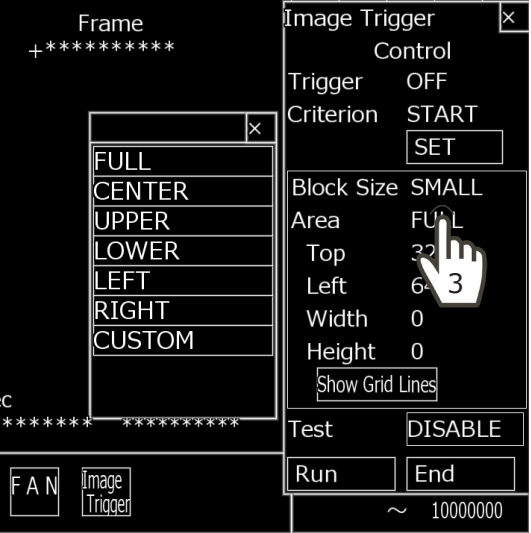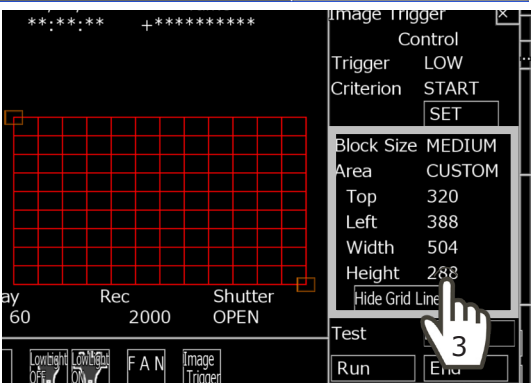
4-39

■Set image trigger detection criteria, detection size, and detection area(2/2)

| | 3 | Set the trigger detection area.
[Show Grid Lines]
The detection area is superimposed
 by the button.
[Hide Grid Lines]
Use the button to clear the superim-
 posed display of the detection area.
Choice: FULL/CENTER/UPPER/LOWER/
 LEFT/RIGHT/CUSTOM
When selecting a CUSTOM, you can
 change the CUSTOM area by sliding
 the rectangles displayed in the upper
 left and lower right corners of the
 detection-area superimposition dis-
 play
(Valid only during VIEW).

The detection area can be changed
 by selecting the top, left, width and
 height tab. | |

(Area / Show Grid Lines)

Frame
+**********

Image Trigger ☒
Control
Trigger OFF
Criterion START
SET

FULL
CENTER
UPPER
LOWER
LEFT
RIGHT
CUSTOM

Block Size SMALL
Area FULL
Top 32
Left 64
Width 0
Height 0
Show Grid Lines

Test DISABLE
Run End
~ 10000000

F A N Image Trigger

::** +**********

Image Trigger ☒
Control
Trigger LOW
Criterion START
SET

Block Size MEDIUM
Area CUSTOM
Top 320
Left 388
Width 504
Height 288
Hide Grid Lines

ay Rec Shutter
60 2000 OPEN

Test
Run End

Low light OFF Low light ON F A N Image Trigger

■Use the image trigger test function

Image Trigger	1	Test image trigger operation. You can check if the trigger works as expected while in VIEW mode	
Run	2	Press [RUN]. The status is displayed from [READY] to [RUN]. The status indication changes from [RUN] to [TRIGGERED] when the image trigger is issued.If the trigger is not issued as expected, press the [END] button once to stop the operation, then review the settings, and check the operation again with the [RUN] button. The [SET] button also shifts to the test state. In addition, the [SET] button updates the detection criteria.	

•If the trigger detection sensitivity is "OFF" or not in VIEW mode, the status display will be [DISABLE].

4-41

Get the Black Balance

Get the black balance (noise and black level correction data) to correct the fixed pattern noise from the sensor.

The image sensor used with the ACS-1 alters the noise from the temperature of the sensor or the recording settings. This noise is called fixed pattern noise and has a pattern that differs for each sensor. With the ACS-1, the black balance (noise and black level correction data) correction is performed from the sensor, and the noise is reduced.
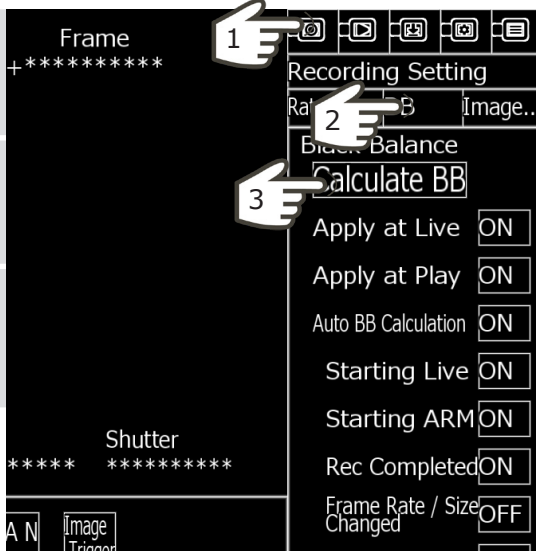
The factory settings for the ACS-1 get the black balance automatically when switching to the STOP mode, the VIEW mode and the ARM mode.

CHECK •Set the auto black balance. (⇒ 🕮 4-43)

■ Get the Black Balance
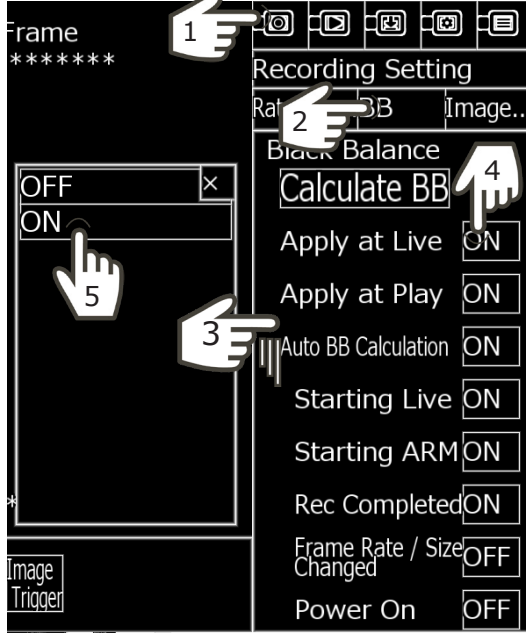
Set the black balance correction to enable/disable. The black balance can also be obtained manually.

■ ⊙	1	Select the recording settings tab icon
BB	2	Select the BB tab box
Black Balance	3	Select the Calculate BB box •Get the black balance.

■Set the Black Balance Details

Set the black balance correction to enable/disable. The black balance can also be set to be obtained automatically.

■◉	1	Select the recording settings tab icon	
BB	2	Select the BB tab box	
Black Balance	3	Scroll through the window under the Rate/Size..tab •The target item is displayed	
	4	Select the target item in the box to the right •A popup window is displayed	
	5	Select the item in the popup window	
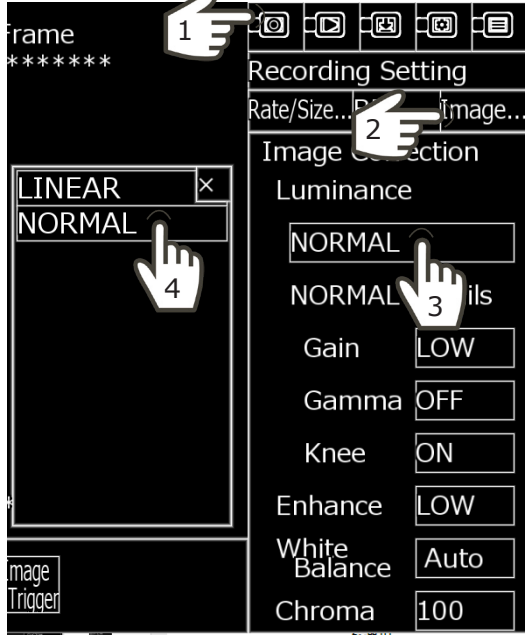
Settings that Can Be Selected in 4.

Apply at Live	Apply to live image	
Apply at Play	Apply to playback image	
Auto BB Calculation	Execute auto black balance for the following items	
	Starting Live	Automatically get the black balance when the VIEW mode starts.
	Starting ARM	Automatically get the black balance when the ARM mode starts.
	Rec Completed	Automatically get the black balance after the recording ends.
	Frame Rate / Size Changed	Automatically get the black balance after changing the frame rate/frame size.
	Power On	Automatically get the black balance after the camera starts up.
	LowLight changed	Automatically get the black balance after the low light changes.

4-43

Set the Image Quality Adjustment (Record)
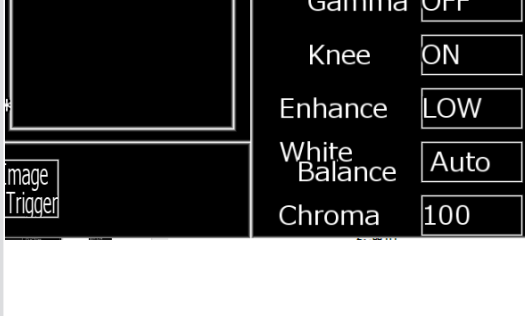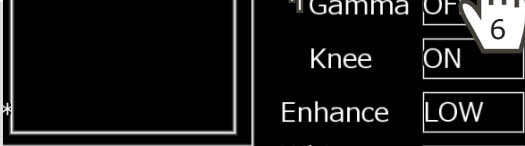
■Select the Luminance (Luminance - LINEAR)

Perform image quality adjustment on the recorded image.

	1	Select the recording settings tab icon
Image...	2	Select the Image...tab box
Luminance	3	Select under the Luminance box •A popup window is displayed
	4	Select the item in the popup window •Select LINEAR Ignore the settings for gain, gamma and knee, and the data is converted to linear and displayed.

■Select the Luminance (Luminance - NORMAL)

Perform image quality adjustment on the recorded image.

■⦿	1	Select the recording settings tab icon
Image...	2	Select the Image...tab box
Luminance	3	Select under the Luminance box •A popup window is displayed
	4	Select NORMAL in the popup window •With the normal settings, the image is displayed with the input/output conversion properties matching the dynamic range for the camera. The gain, gamma and knee can be used. (►📖 4-46)
NORMAL Details	5	Slide the Image...tab box to show the target item
	6	Select the target item in the box to the right under the NORMAL Details •A popup window is displayed
	7	Select the item in the popup window

■Settings that Can Be Selected in 6.

Gain

Sets the brightness.

Item	Setting	Description
Gain	LOW	Lowers the gain by 1.
	MID	Normal brightness.
	HIGH	Raises the gain by 1.

Gamma

Sets the gamma correction

Item	Setting	Description
Gamma	OFF	No gamma correction.
	LOW	Low gamma correction.
	MID	Normal gamma correction.

Knee

Lowers the gain for the signals from the standard level of luminance and sets whether or not to correct by expanding the dynamic range.

Item	Setting	Description
Knee	ON	Knee enabled.
	OFF	Knee disabled.

Enhance

Lowers the gain for the signals from the standard level of luminance and sets whether or not to correct by expanding the dynamic range.

Item	Setting	Description
Enhance	OFF	No contour enhancement.
	LOW	Low contour enhancement.
	MID	Standard contour enhancement.
	HIGH	High contour enhancement.

White Balance

Set to match the white balance photographic environment.

Item	Setting	Description
White Balance	3100K	Lighting color temperature setting for 3100K.
	5000K	Lighting color temperature setting for 5000K.
	9000K	Lighting color temperature setting for 9000K.
	Auto	Calculates the proper RGB gain value from the image currently displayed.
	Reg	Uses the white balance saved in the SET REG function of the camera while recording.

Chroma

Sets the color concentration (chroma).

Item	Setting	Description
Chroma	0	Sets the chroma to 0%. Becomes a B/W image.
	50	Sets the chroma to 50%.
	100	Sets the chroma to 100%. Standard chroma.
	150	Sets the chroma to 150%.
	200	Sets the chroma to 200%.

RGB Matrix

Sets the RGB matrix correction for the image data.

Item	Setting	Description
RGB Matrix	ON	Enables RGB matrix correction.
	OFF	Disables RGB matrix correction.

4-48

5

Play Settings

Play

Play Settings

You can adjust the image quality and set the loop playback settings during play from the play settings tab icon.

■▶ Play Setting ─────────────────────────────────────

■ Items to Set from Operation

Items that can be set by selecting the Operation tab shown after selecting the play setting tab icon.
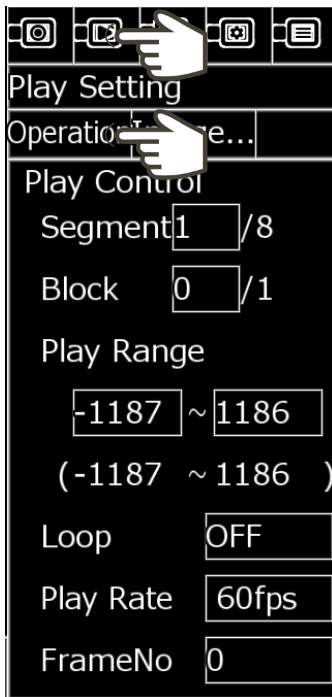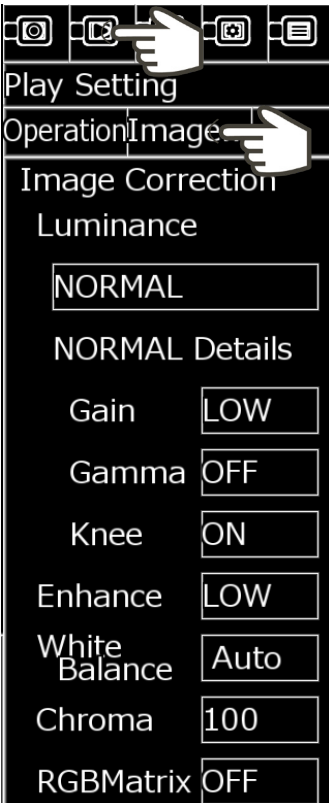
Setting		Details	⏩📖
Play Control	Segment	Set the number of segments	5-8
	Block	Set the block division	5-8
	Play Range	Set the play range	5-4
	Loop	Set the loop playback	5-5
	Play rate	Set the playback rate	5-6
	Frame No.	Select the frame number to display	5-7

Play Setting

Operation Image...

Play Control

Segment 1 /8

Block 0 /1

Play Range

-1187 ~ 1186

(-1187 ~ 1186)

Loop OFF

Play Rate 60fps

FrameNo 0

■▶ Play Setting

■ Items that Can Be Set From Image…

Items that can be set by selecting the Image… tab shown after selecting the play setting tab icon.

	Setting			Details	▶▥
Image Correction	Luminance		Luminance	Luminance	5-9 5-10 5-11
	NORMAL Details	Gain	Gain	Gain	
		Gamma	Gamma	Gamma	
		Knee	Knee	Knee	
		Enhance	Enhance	Enhance	
		White Balance	White Balance	White balance	
		Chroma	Chroma	Chroma	
		RGBMatrix	RGBMatrix	RGB matrix	
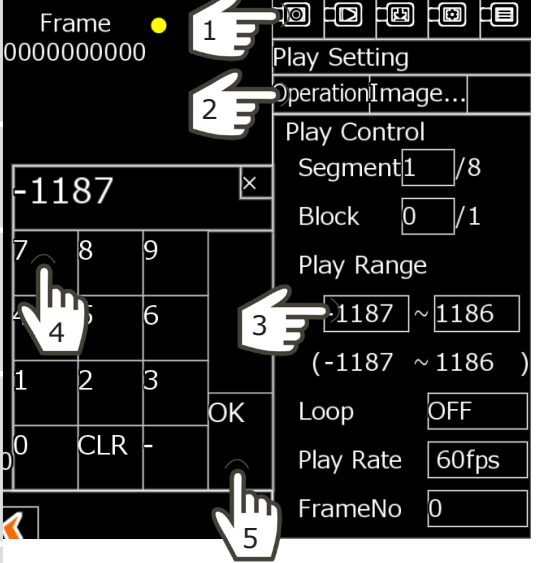
⊘Attention •Settings relating to image correction are also reflected in the saved image.

Play

Specify the Playback Range

You can specify the playback range for your videos.
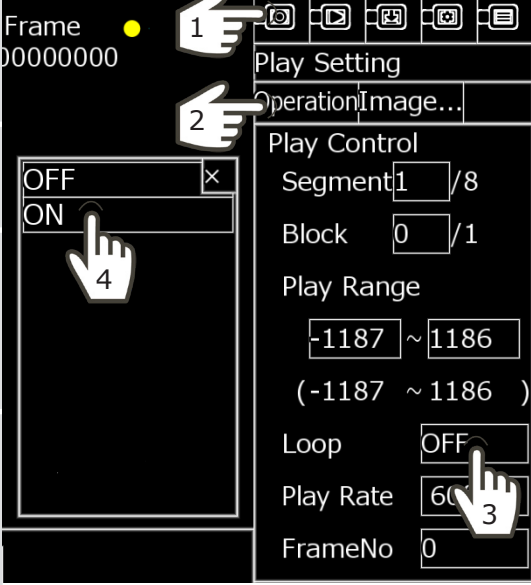
■Specify the Playback Range during the STOP mode

◼▶	1	Select the play settings tab icon
Operation	2	Select inside the Operation tab box
	3	Select under the Play Range box •A keypad is displayed
Play Range	4	Input on the keypad •The frame range that can be selected is given under the box
	5	Select OK on the keypad

Frame
0000000000

Play Setting
OperationImage...

Play Control
Segment 1 /8
Block 0 /1

Play Range
-1187 ~ 1186
(-1187 ~ 1186)
Loop OFF
Play Rate 60fps
FrameNo 0

-1187 ×

7	8	9
4	5	6
1	2	3
0	CLR	-

OK

Loop Playback

Loop playback of the video

■ Loop Playback of the Video during STOP
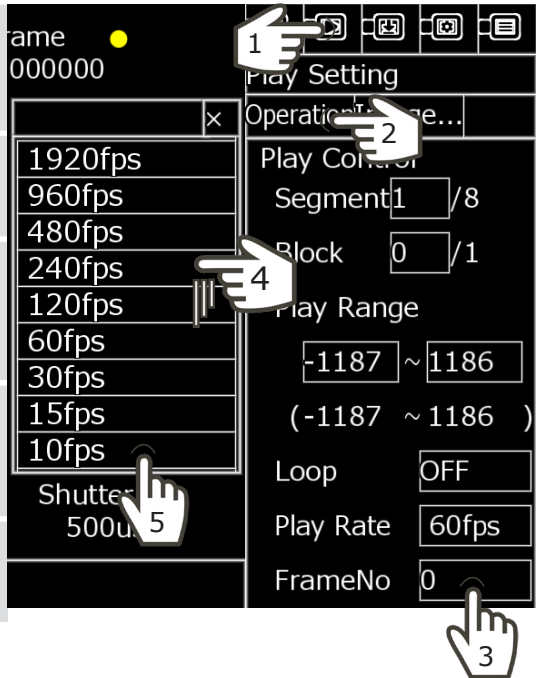
	1	Select the play settings tab icon
Operation	2	Select inside the Operation tab box
Loop	3	Select the box to the right of Loop •A popup window is displayed
	4	Select an item from the popup window

Change the Playback Rate

You can change the playback rate of the video.
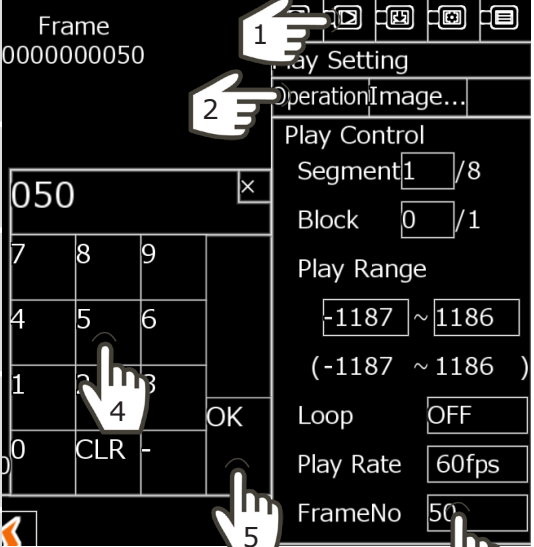
■ Change the Playback Rate

■▶	1	Select the play settings tab icon
Operation	2	Select inside the Operation tab box
Play Rate	3	Select the box to the right of Play Rate •A popup window is displayed
	4	Move by scrolling the popup window •-1920fps to +1920fps
	5	Select an item from the popup window

(00457)H

Specify the Playback Location

You can specify the start location for playback of your video.

■Specify the Frame Location for Playback

■▶	1	Select the play settings tab icon
Operation	2	Select inside the Operation tab box
	3	Select the box to the right of Frame No •A keypad is displayed
FrameNo	4	Input on the keypad of the popup window
	5	Select OK on the keypad

5-7
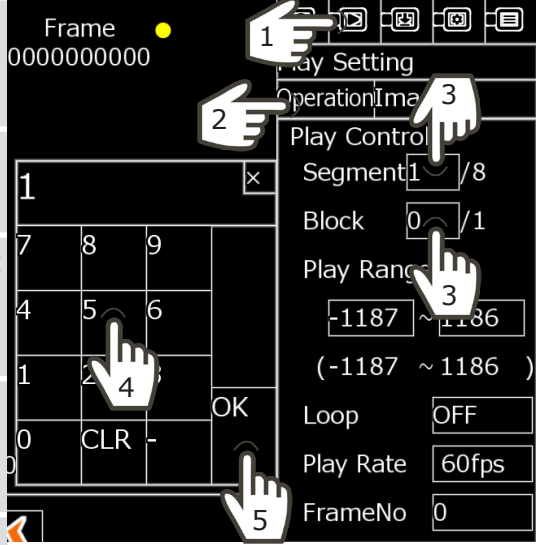
Select the Playback Memory Segments and Blocks

You can select the segments (blocks) to playback when the memory is divided into segments and recorded.

■Select the Memory Segments (Memory Blocks)

If the recorded memory is divided into segments, you can play by selecting the segments for playback. The selected segments will be recorded.

■▶	1	Select the play settings tab icon
Operation	2	Select inside the Operation tab box
	3	Select the box to the right of Segment or Block •A keypad is displayed
Segment Block	4	Input on the keypad of the popup window
	5	Select OK on the keypad

Attention •If you switch to the ARM mode, the new video will overwrite the recorded video.
•Select the recording memory segments. (▶︎ 🕮 7-8)

Adjust the Image Quality of the Video

You can adjust the image quality when using the VIEW mode before recording. (»📖 4-44)

Image quality adjustment can be performed on the following items.(the same details as the live image quality adjustment during the VIEW mode)

Digital Gain	Adjusts the sensitivity. Changes the brightness of the entire image.
White Balance	Corrects the color to properly reflect white based on various light sources.
Enhance	Adjusts the contour enhancement.
Chroma	Adjusts the gradation properties (darkness, brightness shown).
Gamma	Adjusts the chroma.
Knee	Lowers the gain for the bright areas and expands the dynamic range.
RGB Matrix	Improves the color reproduction.
Luminance	Sets the input/output properties for brightness.

CHECK
- The image quality settings for playback videos are also reflected in videos that are saved and downloaded.
- If dividing the memory into segments and recording, the image quality settings can be made separately for each segment.
- Settings for live videos in the VIEW mode and the ARM mode cannot be changed even if the image quality settings for the playback video are changed.
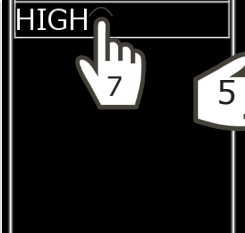
■Set the Luminance Properties (Luminance - LINEAR)

	1	Select the play settings tab icon
Image...	2	Select inside the Image...tab box
	3	Select the box under Luminance •A popup window is displayed
Luminance	4	Select an item from the popup window •Select LINEAR Ignore the settings for gain, gamma and knee, and the data is converted to linear and displayed.

5-9

■Set the Luminance Properties (Luminance - NORMAL)

■▶	1	Select the play settings tab icon
Image...	2	Select inside the Image...tab box
Luminance	3	Select the box under Luminance •A popup window is displayed
	4	Select an item from the popup window •Select NORMAL With the normal settings, the image is displayed with the input/output conversion properties matching the dynamic range for the camera. The gain, gamma and knee can be used. (▶📖 5-11)
NORMAL Details	5	Select the target item in the box to the right under the NORMAL Details •A popup window is displayed
	6	Select the item in the popup window

■Settings that Can Be Selected in 5.

Gain

Sets the brightness.

Item	Setting	Description
Gain	LOW	Lowers the gain by 1.
	MID	Normal brightness.
	HIGH	Raises the gain by 1.

Gamma

Sets the gamma correction

Item	Setting	Description
Gamma	OFF	No gamma correction.
	LOW	Low gamma correction.
	MID	Normal gamma correction.

Knee

Lowers the gain for the signals from the standard level of luminance and sets whether or not to correct by expanding the dynamic range.

Item	Setting	Description
Knee	ON	Knee enabled.
	OFF	Knee disabled.

Enhance

Lowers the gain for the signals from the standard level of luminance and sets whether or not to correct by expanding the dynamic range.

Item	Setting	Description
Enhance	OFF	No contour enhancement.
	LOW	Low contour enhancement.
	MID	Standard contour enhancement.
	HIGH	High contour enhancement.

Play

5-11

White Balance

Set to match the white balance photographic environment.

Item	Setting	Description
White Balance	3100K	Lighting color temperature setting for 3100K.
	5000K	Lighting color temperature setting for 5000K.
	9000K	Lighting color temperature setting for 9000K.
	Auto	Calculates the proper RGB gain value from the image currently displayed.
	Reg	Uses the white balance saved in the SET REG function of the camera while recording.

Chroma

Sets the Chroma.

Item	Setting	Description
Chroma	0	Sets the chroma to 0%. Becomes a B/W image.
	50	Sets the chroma to 50%.
	100	Sets the chroma to 100%. Standard chroma.
	150	Sets the chroma to 150%.
	200	Sets the chroma to 200%.

RGB Matrix

Sets the RGB matrix correction for the image data.

Item	Setting	Description
RGB Matrix	ON	Enables RGB matrix correction.
	OFF	Disables RGB matrix correction.

6
Save Settings

Save

(00457)H

Save Settings

Recorded videos can be saved as video files or still image files.

■ ⬇ Save Setting ─────────────────────

■ Items that Can Be Set from Save

Items that can be set with the Save tab shown after selecting the save settings tab icon.
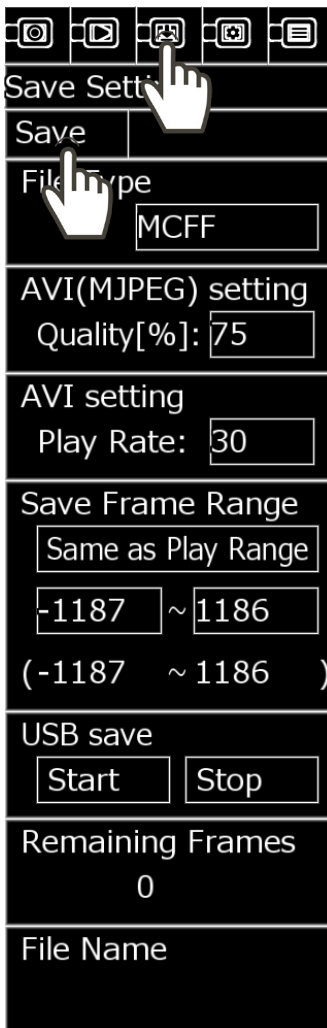
Setting	Details	⏩📖
File Type	•Specify file type •MCFF, AVI (non compressed) , AVI (MJPEG)	6-6
AVI (MJPEG) setting Quality	•Specify AVI compression image quality 1 to 100%	
AVI setting Play Rate	•AVI playback rate setting 1 to 60 fps	
Save Frame Range	•Top box: Specify the save frame range settings •Bottom box: Specify the save frame range settings	6-7
USB save	•USB save, stop	3-31 3-32
Remaining Frames	•Show the number remaining while saving	
File Name	•Show the file name while saving	

Save Setti
Save
File Type
 MCFF
AVI(MJPEG) setting
 Quality[%]: 75
AVI setting
 Play Rate: 30
Save Frame Range
 Same as Play Range
 -1187 ~ 1186
 (-1187 ~ 1186)
USB save
 Start | Stop
Remaining Frames
 0
File Name

Save Videos

Save recorded videos as video files, such as MCFF and AVI.

CHECK •Refer to (⯈ 📖 2-7) for the usable USB device and device connection.
•Save video (⯈ 📖 3-31)

The following two methods are available for saving videos recorded.
•USB save: Save to USB media (USB connected HDD or flash drive).
•Download: Use the control software "MLink" and save to the control PC.

USB storage can be saved from V-PAD without a control PC.

Downloading must be connected to the control PC.

Downloading can be downloaded faster than USB storage, and images can be downloaded in batches from multiple segments and multiple cameras.

This manual describes saving to a USB. Refer to the "MLink user's guide" for storing using the control software "MLink".

Settings Required for Saving

The following settings are required for saving recorded videos.
•Image Quality Adjustment (⯈ 📖 5-9)
•Save File Type and Compression Rate (with MJPEG) , Playback Rate (with AVI, MJPEG) Settings (⯈ 📖 6-6)
•Save Range Settings (⯈ 📖 6-7)

Perform image quality adjustment before recording or during playback after recording.

Save

(00457)H

Save "Images of more than 4GB"

If saving to USB media with the ACS-1, you cannot create a file that is larger than 4GB due to restrictions in the FAT32 file system. Thus, If the size of the MCFF to be saved exceeds 4GB, the MCFF is saved as multiple files. In this case, the 2nd and subsequent files to be saved will have consecutive numbers of "-V2", "-V3" automatically added to the end of the standard file name, as follows.

- 1st file name: MCFF0000.MCF
- 2nd file name: MCFF0000-V2.MCF
- …

If saving to formatted USB media with the exFAT or the NTFS file system, it is saved as a single file instead of dividing. Therefore, we recommend using exFAT as the format.

If using the control software MLink, multiple divided and saved MCFF can be opened and used as a single scene. For details, see the "MLink user's guide".

Set the File Format
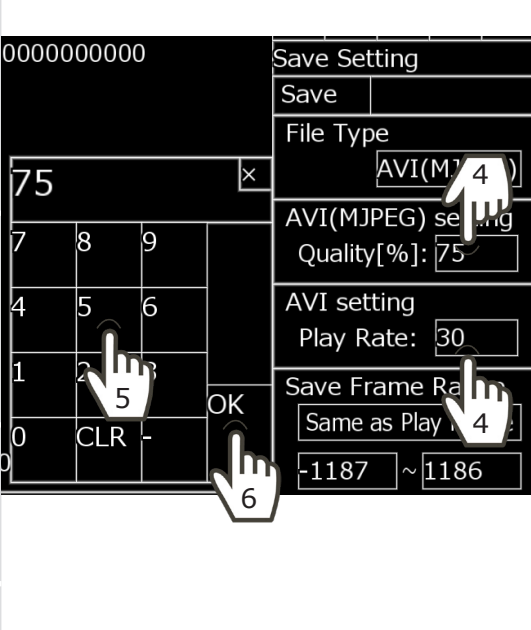
File format for saving videos

With the ACS-1, you can save in the MCFF, AVI (non compressed) and AVI (MJPEG) formats.

•MCFF	Video format especially for the MEMRECAM series. You can save with all of the image data obtained from the sensor, the time stamp (simultaneous recording data such as the time), image quality settings and such. After saving, it is best if you perform image quality adjustment with MLink, or if setting or recording is necessary while recording. The file name will be "MCFF**** (consecutive numbers), with a file extension of "MCF".
•AVI (non-compressed)	A non-compressed AVI (video file format standard to Windows) file. It can be played back with standard video playback software. A codec is not required because it is not compressed and there is not degradation of the image quality. The file names will be "MCAV**** (consecutive numbers)", with a file extension of "AVI".
• AVI (MJPEG)	An AVI file compressed with the Motion JPEG format. The size of the file can be smaller than a non-compressed AVI file but this comes with a degradation in the image quality. Also, since data compression is performed, it takes time to save. Motion JPEG codec or MLink is required for playback. The file names will be "MCAV**** (consecutive numbers)", with a file extension of "AVI".

Save

6-5

■Specify the File Format

■⬇	1	Select the save settings tab icon
File Type	2	Select under the File Type box •A popup window is displayed
	3	Select an item from the popup window •MCFF •AVI (non-compressed) •AVI (MJPEG)
Quality[%]: Play Rate	4	With a File Type of AVI (MJPEG) AVI (MJPEG) setting Quality[%]: select the box to the right •A keypad is displayed With a File Type of AVI •AVI setting Play Rate : select the box to the right •A keypad is displayed
	5	Input on the keypad •Quality 1 to 100% •Play Rate 1 to 60fps
	6	Select OK on the keypad

Settings Required for Saving
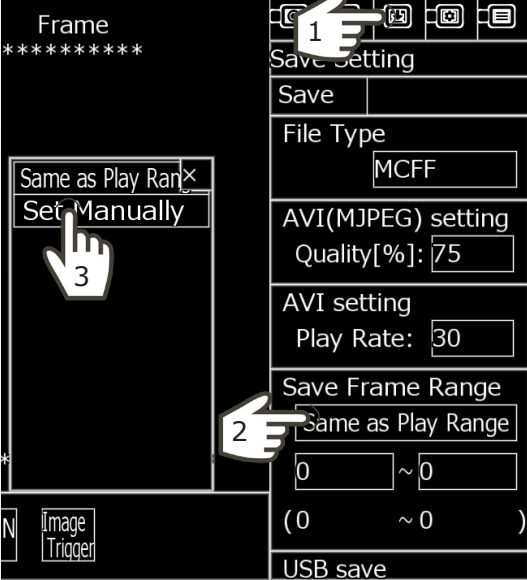
The image quality settings are saved in the file where the video adjusted with the details set with the play settings is located (▸🕮 5-9). The image quality settings cannot be changed after saving.

The MCFF image quality settings do not degrade when playing with MLink and cannot be changed. See the "MLink user's guide" for details.

(00457)H

Set the Save Range

Specify any range to be set. You can also specify the playback range as the save range.

■Set the Save Range

■⬇	1	Select the save settings tab icon
Save Frame Range	2	Select under the Save Frame Range box •A popup window is displayed
	3	Select Set Manually from the popup window •Same as Play Range Use the play range settings in the play settings tab. •Set Manually Use the recording range settings in the save settings tab.
Save Frame Range	4	When selecting Save Frame Range Set Manually, select the number box under the Save Frame Range •A keypad is displayed
	5	Input on the keypad •The range that can be input is shown in parentheses under the box
	6	Select OK

Frame
****

Save Setting
Save

File Type
MCFF

AVI(MJPEG) setting
Quality[%]: 75

AVI setting
Play Rate: 30

Save Frame Range
Same as Play Range
0 ~ 0
(0 ~ 0)

USB save

Same as Play Ran ×
Set Manually

Image Trigger

Save

0000000000

Save Setting
Save
Play Rate: 30

Save Frame Range
Same as Play Rate
-1187 ~ 1186
(-1187 ~ 1186)

USB save
Start Stop

Remaining Frames
0

-1187 ×
7 8 9
4 5 6
1 2 3
0 CLR -
OK

6-7

7

Detailed Settings

Detailed

Items for Detailed Settings

(00457)H

⬛⚙ Detail Setting ───────────────────────

⬛ Items that Can Be Set from Memory

Items that can be set by selecting the Memory tab shown after selecting the detailed settings tab icon.

	Setting		Details	⏩📖
	Memory Segmentation	Number of Segmentation	•Settings for the Number of Divided Segments	7-7
		Active Segment	•For Recording Set recording segment	

■ Detail Setting

■ Items that Can Be Set from Signal(1/2)

Items that can be set by selecting the Memory tab shown after selecting the detailed settings tab icon.

	Setting	Details	▸▸▥
	Input Signal (1 of 3 Trigger)	•Trigger Selection	7-9
		•Detection Method	7-15
		•TRIG1 Input	7-12
		•TRIG2 Input	
		•Use TRIG1 Filter for TRIG2	7-16
		•TRIG1 Filter (x100ns)	
		•TRIG2 Filter (x100ns)	
	Input Signal (2 of 3 EST)	•EST Input	7-30
		•EST1	7-3
		•EST2	
		•Use EST1 Filter for EST2	7-17
		•EST1 Filter	
		•EST2 Filter	
		•Use EST in Live	7-18
	Input Signal (3 of 3 ARM)	•ARM Input	7-12

Screen panel:

Detail Setting

Memory | Signal | RecA | RecB

Input Signal (1 of 3 Trigger)
Trigger Selection: TRIG1
Detection Method: LEVEL
TRIG1 Input: NEGA
TRIG2 Input: Current ON
Use TRIG1 Filter for TRIG2: YES
TRIG1 Filter (x100ns): 0
TRIG2 Filter (x100ns): 0

Input Signal (2 of 3 EST)
EST Input: EST1
EST1: NEGA
EST2: NEGA
Use EST1 Filter for EST2: YES
EST1 Filter (x100ns): 0
EST2 Filter (x100ns): 0
Use EST in Live: ON

Input Signal (3 of 3 ARM)
ARM Input: NEGA

Detailed

7-3

(00457)H

■[⚙] Detail Setting

■Items that Can Be Set from Signal(2/2)

Items that can be set by selecting the Memory tab shown after selecting the detailed settings tab icon.

Setting	Details	▶▶🕮
Output Signal	•EPO Output	7-13
	•ARM Status Output	
	•FAULT Status Output	
	•VD OUT Polarity	7-14
	•VD OUT Multiple	
	•VD OUT Delay[100ns]	
	•TRIG OUT	
	•TRIG OUT Polarity	
	•TRIG OUT Mode	
	•TRIG OUT Delay[100ns]	
General I/O	•In	
	•OUT1	
	•OUT2	
	•OUT3	

■⚙ Detail Setting

■ Items that Can Be Set from RecA

Items that can be set by selecting the RecA tab shown after selecting the detailed settings tab icon.
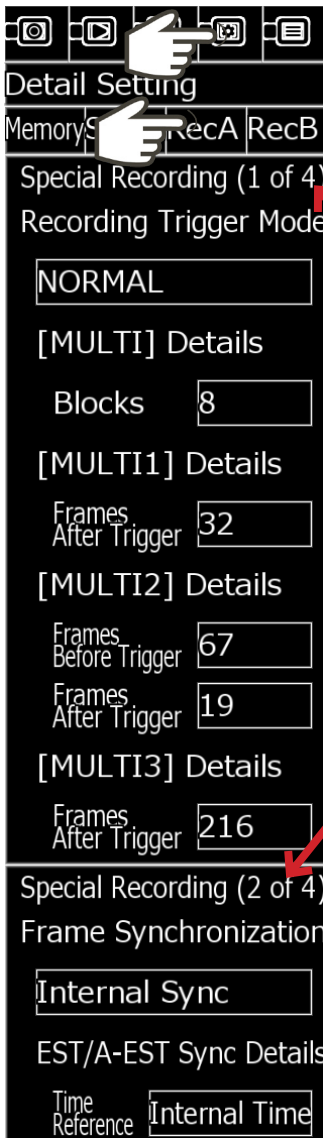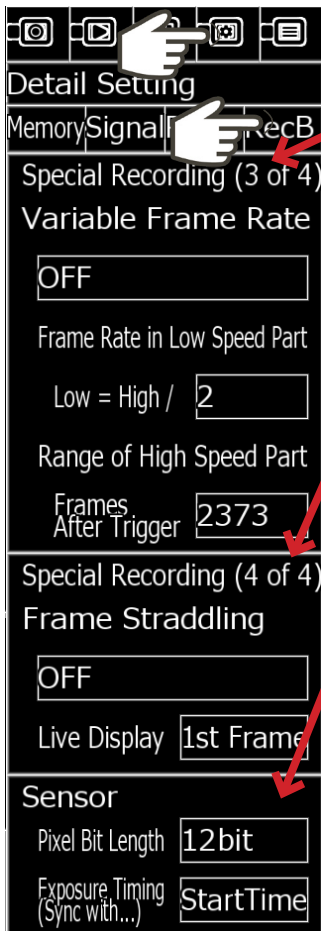
Setting	Details		⏩📖
Special Recording (1 of 4)	Recording Trigger Mode		7-19
	[MULTI] Details	•Blocks	7-23
	[MULTI1] Details	•Frames After Trigger	7-24
	[MULTI2] Details	•Frames Before Trigger •Frames After Trigger	
	[MULTI3] Details	•Frames After Trigger	
Special Recording (2 of 4)	Frame Synchronization		7-25
	EST/A-EST Sync Details	•Time Reference	7-29 7-30

Detailed

 Detail Setting

■Items that Can Be Set from RecB

Items that can be set by selecting the RecB tab shown after selecting the detailed settings tab icon.

Setting	Details	▸▥
Special Recording (3 of 4)	•Variable Frame Rate •Frame Rate in Low Speed Part •Range of High Speed Part	7-38
Special Recording (4 of 4)	•Frame Straddling •Live Display	7-40
Sensor	•Pixel Bit Length •Exposure Timing (Sync with...)	7-43

Partition the Memory for Recording

Partition the recording memory into "segments" to continue recording multiple times.

Memory Segments

The recording memory can be partitioned into a maximum of 64 "segments". If partitioned, the recording time for a single memory segment decreases according to the number of partitions but each of the partitioned "segments" can be used as independent recording areas.

Memory Capacity	Segment Sizes and the Number of Segments that Can Be Selected
64GB model	68GBx1, 34GBx2, 17GBx4, 8.5GBx8, 4.2GBx16, 2.1GBx32, 1.0GBx64
128GB model	137GBx1, 68GBx2, 34GBx4, 17GBx8, 8.5GBx16, 4.2GBx32, 2.1GBx64
256GB model	274GBx1,137GBx2, 68GBx4, 34GBx8, 17GBx16, 8.5GBx32, 4.2GBx64

Recording with the memory partitioned into segments can be performed as follows.
- Immediately film without waiting for it to be saved after recording.
- Combined downloads are possible with MLink after recording multiple scenes.
- Only the required scenes can be saved on the USB device after recording multiple scenes.
- Set/get the black balance for each segment.

Attention
- Videos recorded in the memory can all be deleted with the memory partition settings.
  Make sure to use the partition settings after checking if it is acceptable to delete the videos.
- Save videos. (》𝄞 3-31)
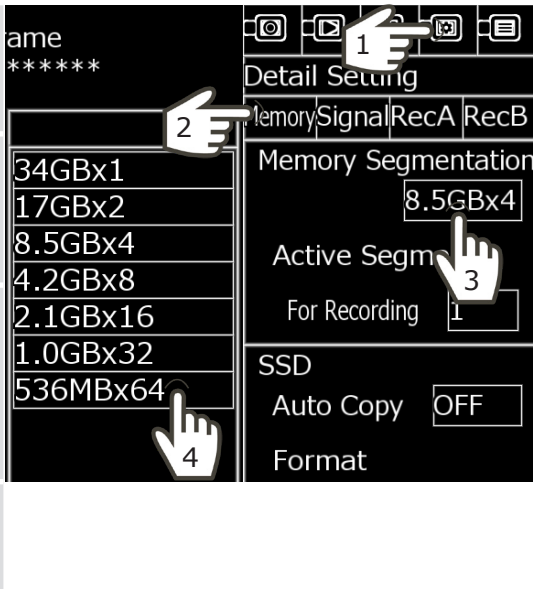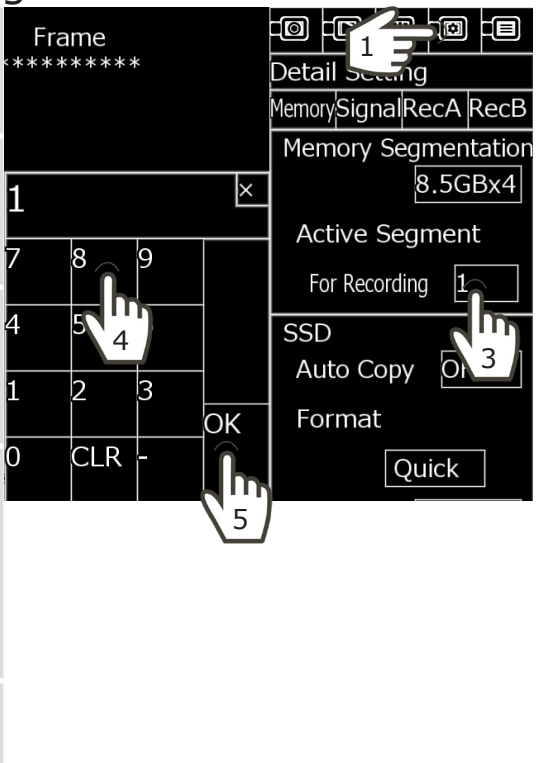
CHECK
- Use MLink to use the function to protect each segment.
  Refer to the "MLink user's guide" for the operating method.

Detailed

(00457)H

■ Partition the Memory

■■[⚙]	1	Select the detailed settings tab icon
Memory	2	Select inside the Memory tab box
Number of Segments	3	Select the box to the right of Number of Segments •A popup window is displayed
	4	Select the desired item in the popup window

■ Select the Segment for Recording

■■[⚙]	1	Select the detailed settings tab icon
Memory	2	Select inside the Memory tab box
For Recording	3	Select the box to the right of For Recording •A keypad is displayed
	4	Input on the keypad •The number that can be input is up to the number of segments for partitioning indicated in Number of Segments.
	5	Select OK

Input the Trigger from External Input/Output

The MEMRECAM ACS-1 has two external trigger inputs, specifically TRIG1, TRIG2, so triggers can be input with signals from other devices or switches.

■ Connect the External Trigger

Connect to TRIG1

The specifications for the external trigger signals from the TRIG connector (TRIG1) are for TTL level contact input with insulating input.

These signals can be handled easily, and one switch and two wires can be connected with the contact input. These are recommended in clean environments with no external noise.

TRIG1 Signal Circuit (⟫ 🕮 9-49), TRIG Connector Specifications (⟫ 🕮 10-61)
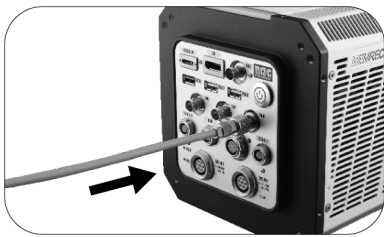
1 Connect the BNC cable to the TRIG connector

- Connect the BNC cable to the TRIG connector on the rear panel.

Connect to TRIG2

The TRIG2 can be used to connect the J3 branch cable (sold separately) to the REMOTE connector.

The specifications for the external trigger signals from TRIG2 are for current loop input with a photocoupler with insulating input.

The trigger is enabled at an applied voltage of 5V or more. These signals have high noise resistance and are suitable for long range cables. We recommend using this input in environments where noise such as static electricity is frequently generated. However, using this input requires an external power source.

TRIG2 Signal Circuit (⟫ 🕮 9-50), TRIG2 Input (REMOTE Connector) Speciifcations(⟫ 🕮 10-58)
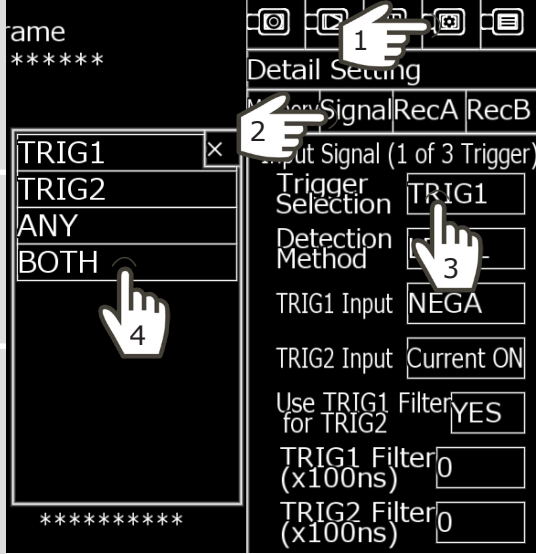
1 Connect the BNC cable to the TRIG connector

- Connect the BNC cable to the TRIG connector on the rear panel.

Yellow

P34<TRIG2>
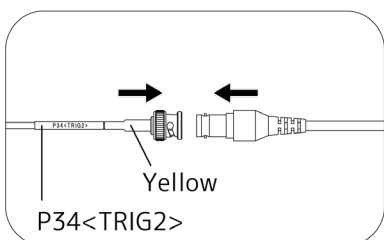
2 Connect the BNC cable (female) to the J3 branch cable TRIG 2 input.

- Connect the BNC cable to the TRIG2 input of the J3 branch cable.
- Connect the other end of the BNC cable to the output device for trigger signals.

Detailed

7-9

■Select the External Trigger Signals

	1	Select the detailed settings tab icon
Signal	2	Select inside the Signal tab box
Trigger Selection	3	Select the box to the right of Trigger Selection •A keypad is displayed
	4	Select the desired item in the popup window

•TRIG1	Enable external trigger signals from the TRIG connector
•TRIG2	Enable external trigger signals from TRIG2
•ANY	Enable fast external signals from either the TRIG or the TRIG2 connector
•BOTH	Enable external signals simultaneously from both the TRIG and the TRIG2 connectors

■ Input Triggers from the External Trigger

	1	Select the recording settings tab icon
ARM	2	Switch to the ARM mode •Switch to the ARM mode and start recording.
	3	Input trigger signals from the external input/output selected •If trigger signals are input (enabled at L), the trigger is input and it switches to the REC mode.

CHECK •Refer to "Set the Trigger Filter" (▸🕮 7-16) for the external trigger filter settings.

Attention •With the initial settings, the polarity of the input trigger is "NEGA (L) " for TRIG1 and "CRNT ON (Current ON)" for TRIG2. The polarity can be changed in the settings.

•Select the polarity for the external input/output signals. (▸🕮 7-12)
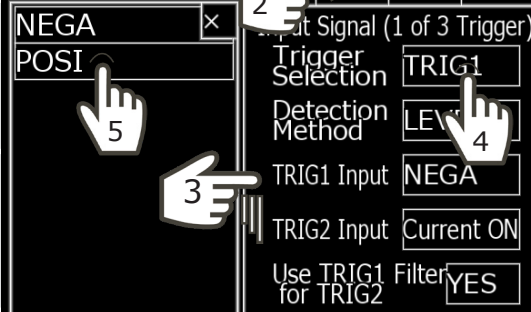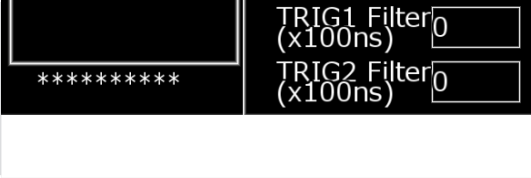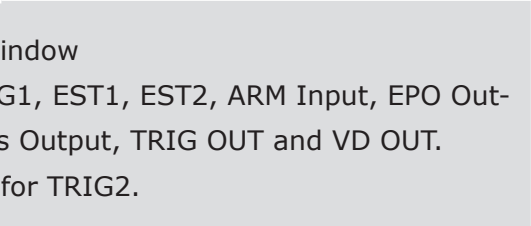
•When switching to the VIEW mode or the ARM mode and the trigger input is at the L level, the warning message of "Warning Trigger signal is asserted" is shown on the screen. Check the trigger polarity settings and the input signals.

Detailed

7-11

Select the Setting for the External Input/Output Signals

■Select the Polarity for the External Input/Output Signals

The following external input/output signals can be set with the enabled polarity of either the H level (rising) or the L level (falling).

- •External trigger input (TRIG1, TRIG2)
- •External synchronization signal input (EST1, EST2)
- •ARM command input (ARM CMD)
- •Exposure pulse output (EPO)
- •ARM status output (ARM STS)
- •FAULT status output (FAULT STS)
- •Trigger signal output (TRIG OUT)
- •Sync signal output(VD OUT)

■□✿	1	Select the detailed settings tab icon
Signal	2	Select inside the Signal tab box
	3	Slide inside the box under the Signal tab
	4	Select the desired input/output polarity setting item in the box to the right •A popup window is displayed
	5	Select the desired item in the popup window •Select from "POSI" or "NEGA" for TRIG1, EST1, EST2, ARM Input, EPO Output, ARM Status Output, FAULT Status Output, TRIG OUT and VD OUT. •Select from "CRNTON" or "CRNTOFF" for TRIG2.

External Input/Output Signal		Polarity	Details
Input Signal (1 of 3 Trigger)	TRIG1	POSI	External trigger signals from the TRIG connector detected current on(insulating)
		NEGA (Note)	External trigger signals from the TRIG connector detected current off (short circuit)
	TRIG2	CRNTON (Note)	External trigger signals from the TRIG2 input (REMOTE connector) detected current on
		CRNTOFF	External trigger signals from the TRIG2 input (REMOTE connector) detected current off
Input Signal (2 of 3 EST)	EST1	POSI	EST signals from the EST connector detected with the rising edge
		NEGA (Note)	EST signals from the EST connector detected with the falling edge
	EST2	POSI	EST signals from the EST2 (REMOTE connector) detected with the rising edge
		NEGA (Note)	EST signals from the EST2 (REMOTE connector) detected with the falling edge
Input Signal (3 of 3 ARM)	ARM Input	POSI	ARM command signals detected with the rising edge
		NEGA (Note)	ARM command signals detected with the falling edge
Output Signal	EPO Output (EPO connector/REMOTE connector)	POSI	During exposure, H level signals are output
		NEGA (Note)	During exposure, L level signals are output
	ARM Status Output	POSI	During the ARM mode, H level signals are output
		NEGA (Note)	During the ARM mode, L level signals are output
	FAULT Status Output	POSI	During a FAULT status, H level signals are output
		NEGA (Note)	During a FAULT status, L level signals are output

(Note) Factory settings

Detailed

7-13

External Input/Output Signal		Polarity	Details
Output Signal	VD OUT Polarity	POSI	Outputs a signal synchronized with the rising edge of the camera's internal synchronization signal
		NEGA (Note)	Outputs a signal synchronized with the falling edge of the camera's internal synchronization signal
	VD OUT Multiple	x1/4, x1/2, x1(Note), x2, x4, x6, x8, x10	Set the frequency division and multiplication for the sync signal (frame rate) inside the camera.
	VD OUT Delay[100ns]	Numeric input	Sets the delay time of the output timing for the camera's internal sync signal
	TRIG OUT	OFF (Note)	Output TRIG status signal
		ON	Output trigger signal generated inside the camera
	TRIG OUT Polarity	POSI	Trigger signal is output at "H" level.
		NEGA (Note)	Trigger signal output at "L" level
	TRIG OUT Mode	CENTER (Note)	The trigger signal is output at the timing of the center of the next frame.
		THROUGH	Trigger input signal is output as is
		DELAY	The trigger signal is output at the timing of the delay time setting from the start of the next frame.
	TRIG OUT Delay[100ns]	Numeric input	Set the delay time from the start of the next frame until the trigger signal is output.
General I/O	In	ARM IN (Note)	ARM command input
	OUT1 OUT2 OUT3	FAULT	FAULT status output
		ARM	ARM status output
		TRIGOUT	Trigger signal output
		VDOUT	Sync signal output

(Note) Factory settings

7-14

■Select the Trigger Signal Detection Method

⊘Attention

- When using external trigger signals for multi-trigger/multi-manual recording, and the "Trigger Signal Detection Method" is LEVEL, if moved to the next block with the trigger in the continuous input state, the trigger is input immediately to the next block so it may not have the expected result.
- In that case, set the "Trigger Signal Detection Method" to edge.
- Multi-trigger Detection (9-26)
- Multi-manual Recording (9-31)

■⚙	1	Select the detailed settings tab icon
Signal	2	Select inside the Signal tab box
Detectio Method	3	Select the box to the right of Detection Method • A popup window is displayed
	4	Select the desired item in the popup window • Select from "EDGE" or "LEVEL"

■Set the Trigger Filter

There is a built-in digital noise filter for trigger input with the MEMRECAM ACS-1. If there is noise in the trigger signals, set the filter value larger to activate the filter.

The filter value is the time delay when an exact rectangle pulse with no chattering is input.

Set within a range of 0.0 to 6553.5μsec at units of 100nsec.

■□⚙	1	Select the detailed settings tab icon
Signal	2	Select inside the Signal tab box
Use TRIG1 Filter for TRIG2	3	Select the box to the right of Use TRIG1 Filter for TRIG2 •A popup window is displayed
	4	Select the desired item in the popup window •YES:Applies the TRIG1 filter to the TRIG2 filter •NO:Applies the TRIG2 filter to the TRIG2 filter
TRIG1 Filter (x100ns) TRIG2 Filter (x100ns)	5	Select the desired input/output polarity setting in the box to the right •A keypad is displayed
	6	Input on the keypad in the popup window •The number input x100ns is used as the filter value. (e.g.)200 → 20000ns(20μs)
	7	Select OK on the keypad

7-16

■Set the EST Filter

There is a built-in digital noise filter for EST input with the MEMRECAM ACS-1. If there is noise in the EST signals, set the filter value larger to activate the filter.

The filter value is the time delay when an exact rectangle pulse with no chattering is input.

Set within a range of 0.0 to 65535nsec at units of 100nsec.

■□[⚙]	1	Select the detailed settings tab icon	
Signal	2	Select inside the Signal tab box	
	3	Slide inside the box under the Signal tab	
Use EST1 Filter for EST2	4	Select the box to the right of Use EST1 Filter for EST2 •A popup window is displayed	
	5	Select the desired input/output polarity setting in the box to the right •A keypad is displayed	
EST1 Filter (x100ns) EST2 Filter (x100ns)	6	Select the desired input/output polarity setting in the box to the right •A keypad is displayed	
	7	Input on the keypad in the popup window •The number input x100ns is used as the filter value. (e.g.)100 → 10000ns(10μs)	
	8	Select OK on the keypad	
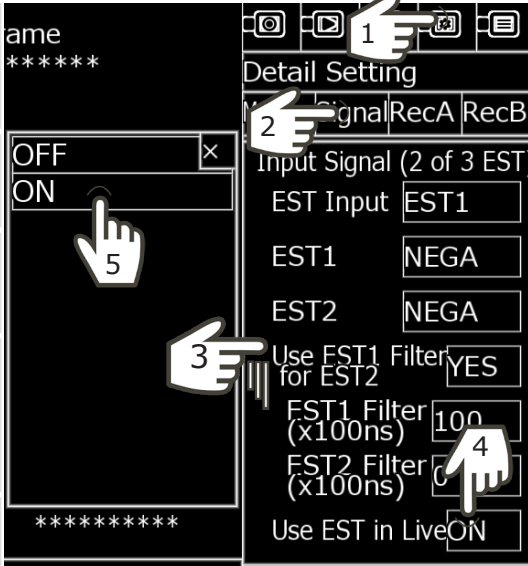
■ Viewing Images Synchronized to EST Signals in the VIEW Mode

If recording with external synchronization signals (EST signals), you can select either "View images synchronized to EST signals in the VIEW mode" or "View images with the synchronization signals in the camera". (Use EST in Live)

Use EST in Live

•OFF: In the VIEW mode, the image is displayed with the internal synchronization signals.

•ON: In the VIEW mode, the image is displayed synchronized with the EST signals just as in the ARM mode.

The settings for Use EST in Live are settings only for the VIEW mode. If recording with external synchronization signals (EST), set either ON or OFF and record in the ARM mode by synchronizing to the EST signals. Also, if recording with internal synchronization signals (INT), display and record with all of the internal synchronization signals, regardless of the settings for Use EST in Live.

■□⚙	1	Select the detailed settings tab icon	
Signal	2	Select inside the Signal tab box	
	3	Slide inside the box under the Signal tab	
Use EST in Live	4	Select the box to the right of Use EST in Live •A popup window is displayed	
	5	Select the desired item in the popup window •OFF: Internal synchronization in the VIEW mode •ON: EST synchronization signals in the VIEW mode also	

Select the Recording Method

In addition to standard recording, it is possible to photograph in a method with operation different from the trigger, specifically burst recording, multi-trigger recording and event recording. Also, if recording in ranges partitioned into segments, it is possible to photograph sequentially by switching segments automatically after recording.

Recording Method

With the MEMRECAM ACS-1, in addition to the recording method from standard trigger input, it is also possible to select the following recording methods.

•Normal Recording Method	The method of recording images in memory segments with a single trigger input
•Event Recording Method	The method of recording where the first trigger input operates as a recording trigger in a manner identical to the normal recording method, and the second and subsequent trigger signals from the external input/output are recorded as events
•Burst Recording Method	The method of recording only frames in the time frame when the triggers from the external input/output are enabled
•Multi-trigger Recording Method	The method of photographing multiple actions by partitioning a single segment into a maximum of 64 blocks with a uniform size
•Multi-manual Recording Method	The method of sequentially photographing actions that occur repeatedly by specifying the number of frames per single block
•Linear Recording Method	The method of photographing frames into segments for the recording time by controlling the "pause" and "reopen" during recording with a V-PAD key input

Attention
•If using the burst recording method or the event recording method, trigger input from the external input/output is required. (For the event recording method, only the first recording trigger can be input from the V-PAD.)

•Input the trigger from the external input/output. (➡ 📖 7-9)

Detailed

7-19

Automatically Switch Segments, Automatically Switch Blocks

When selecting each recording method, also select the combined function to sequentially record by automatically switching segments (and blocks) simultaneously.

Recording by partitioning the memory into segments (↠ 📖 7-8)

Automatically switch segments (only the normal/event/burst/multi-trigger recording methods)	
•AUTO	Automatically switch segments when recording ends. Once the segment switches, it automatically switches to the ARM mode. The recorded segments are protected and will not be overwritten.
•LOOP	Automatically switch segments and modes in the same manner as AUTO. The recorded segments are no protected. Once all of the segments have finished recording, it returns to the first segment and continues to record in the ARM mode. Press the STOP key to finish recording.

Automatically switch blocks (only the multi-trigger/multi-manual recording methods)	
•ALL BLOCKS	Automatically switch blocks when recording ends. Once the block switches, it automatically switches to the ARM mode. The segments are not automatically switched. Once all of the blocks have finished recording, recording is finished.
•CONTINUOUS	Automatically switch blocks when recording ends. Once the block switches, it automatically switches to the ARM mode. Once all of the blocks have finished recording, it returns to the first block and continues to record in the ARM mode. Press the STOP key to finish recording.

7-20
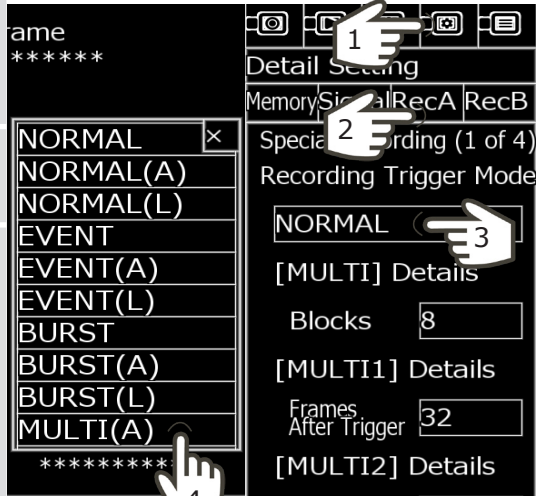
Select the Recording Method with the V-PAD

If selecting the recording method from the V-PAD, select the recording method and the combination of automatic switching of segments (or blocks).

V-PAD Setting	Recording Method	Automatic Segment (or Block) Switching
NORMAL	Normal	None
NORMAL (A)	Normal	AUTO
NORMAL (L)	Normal	LOOP
EVENT	Event	None
EVENT (A)	Event	AUTO
EVENT (L)	Event	LOOP
BURST	Burst	None
BURST (A)	Burst	AUTO
BURST (L)	Burst	LOOP
MULTI (A)	Multi-trigger	ALL BLOCKS
MULTI (C)	Multi-trigger	CONTINUOUS
MULTIS (A)	Multi-trigger	AUTO
MULTIS (L)	Multi-trigger	LOOP
MULTI1 (A)	Multi-manual	ALL BLOCKS
MULTI1 (C)	Multi-manual	CONTINUOUS
MULTI2 (A)	Multi-manual	ALL BLOCKS
MULTI2 (C)	Multi-manual	CONTINUOUS
MULTI3 (A)	Multi-manual	ALL BLOCKS
MULTI3 (C)	Multi-manual	CONTINUOUS
LINEAR	Linear	None

Detailed

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■Select the Recording Method
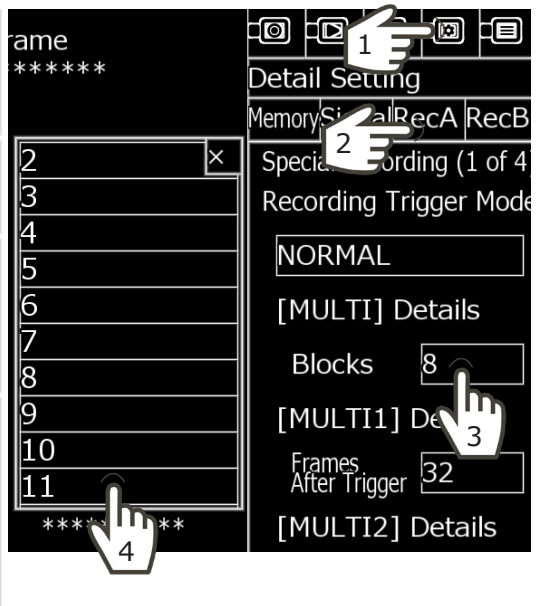
Select the recording method and the combination of automatic segment switching.

■⚙	1	Select the detailed settings tab icon	
RecA	2	Select inside the RecA tab box	
Recording Trigger Mode	3	Select the box under Recording Trigger Mode •A popup window is displayed	

	4	Select the desired item in the popup window		
		NORMAL	NORMAL (A)	NORMAL (L)
		EVENT	EVENT (A)	EVENT (L)
		BURST	BURST (A)	BURST (L)
		MULTI (A)	MULTI (C)	MULTIS (A)
		MULTIS (L)	MULTI1 (A)	MULTI1 (C)
		MULTI2 (A)	MULTI2 (C)	MULTI3 (A)
		MULTI3 (C)	LINEAR	

7-22

■ Set the Number of Partitions for the Blocks for Multi-trigger

If using the multi-trigger recording method, specify the number of partitions for the blocks.
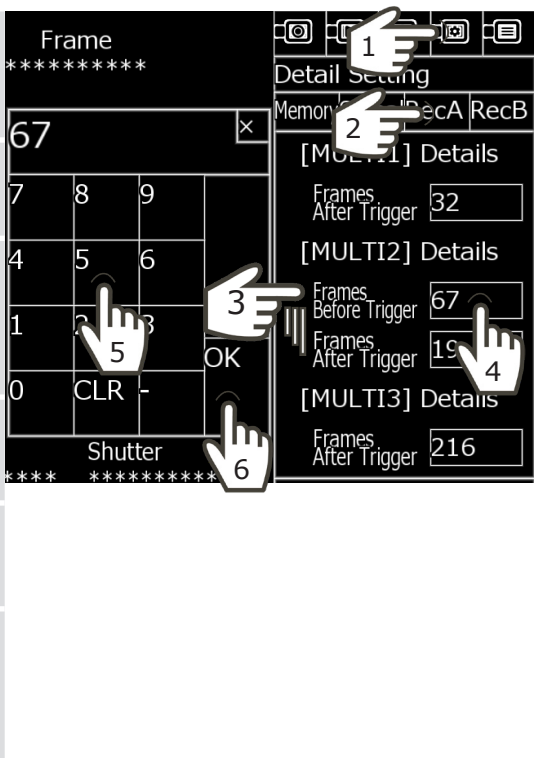
⊘Attention •Cannot be used with the multi-manual recording method. (»»🕮 9-31)

■■⚙	1	Select the detailed settings tab icon
RecA	2	Select inside the RecA tab box
	3	Select the box to the right of Blocks •A popup window is displayed
Blocks	4	Select the desired item in the popup window •The minimum is 2, the maximum is 64.

7-23

■Set the Number of Frames for the Blocks for Multi-manual

If using the multi-manual recording method (▸▯ 9-31), specify the number of frames for the blocks.

■[⚙]	1	Select the detailed settings tab icon
	2	Select inside the RecA tab box
RecA	3	Slide inside the box under the RecA tab
	4	Select the Frames Before Trigger box •A keypad is displayed
Frames Before Trigger	5	Input using the keypad
	6	Input OK on the keypad •Set just like in "Frames After Trigger".

Select the Synchronization Method
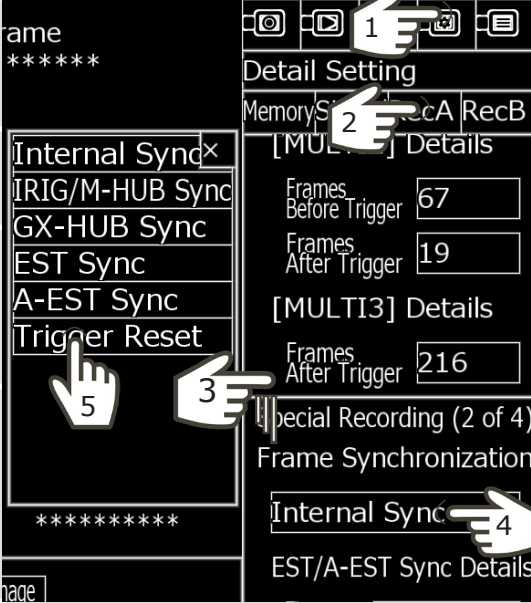
External synchronization input is available on the MEMRECAM ACS-1, and the exposure timing can be synchronized with other devices and cameras for recording.

■Select the Synchronization Method

Camera time synchronization	Time synchronization on the timers inside the cameras. Select if using a single camera or if precise time synchronization is not required. (If the control PC is connected, the times are matched with the PC time.)
IRIG/M-HUB time synchronization	IRIG-B timecode synchronization. Select with the following. •If using a single MEMRECAM ACS-1, input the IRIG-B timecode from the IRIG-B input on the J3 branch cable (sold separately) connected to the REMOTE connector •If there are multiple cameras connected using the GX-HUB and the IRIG-B timecode is input to the GX-HUB (the HX series and the GX series can be combined.)

IRIG-B Signals	
Standard	IRIG Standard 200-98
Recommended Voltage	3Vpp
Input Voltage Allowed	1 to 10Vpp
Other	High impedance, Isolation transformer input

GX-HUB time synchronization	Time synchronization on the timers inside the GX-HUB. Select with multiple cameras connected using the GX-HUB. If the control PC is connected, the times are matched with the PC time. If not using a control PC, recording with multiple cameras is synchronized but the precise absolute time (day/hour/minute/second) cannot be obtained.
EST synchronization	Recording by synchronizing the camera to the external synchronization signals.
A-EST synchronization	Recording by synchronizing the camera to the external synchronization signals. This is no different than EST synchronization.
Trigger Reset	Resynchronize with the trigger input signals. Select when you want to synchronize with an external device using the trigger signals. The time precision for recording on the MEMRECAM ACS-1 is ±0.01% or less. For time synchronization with trigger reset, be careful of major errors in the timing after the trigger input signals.

Detailed

(00457)H

■ Select the Synchronization Method

If using the multi-manual recording method (⇨▯ 9-31), specify the number of frames for the blocks.

	1	Select the detailed settings tab icon
RecA	2	Select inside the RecA tab box
	3	Slide inside the box under the RecA tab
Frames Before Trigger	4	Select the box under Frame Synchronization •A popup window is displayed
	5	Select the desired item in the popup window

	•Internal Sync	Camera time synchronization
5	•IRIG/M-HUB Sync	IRIG time synchronization
	•GX-HUB Sync	GX-HUB time synchronization
	•EST Sync	EST synchronization
	•A-EST Sync	A-EST synchronization
	•Trigger Reset	Trigger reset

Synchronized Recording for External Synchronization Signals (EST)

External synchronization input is available on the MEMRECAM ACS-1, and the exposure timing can be synchronized with other devices and cameras for recording.

External and Internal Synchronization

The MEMRECAM ACS-1 is based on the sensor exposure start timing, and starts recording.

This exposure start timing is synchronized to the synchronization signals from the camera or the exposure start signals input externally.

Internal Synchronization Signals (INT)	Synchronized to synchronization signals (VD signals) generated by the MEMRECAM ACS-1 camera
External Synchronization Signals (EST1)	Synchronized to exposure start signals input from the EST connector (EST : External Shutter Trigger, Exposure Start)
External Synchronization Signals (EST2)	Synchronized to exposure start signals input from the EST2 connector.

When recording using EST, the exposure starts when the signals input during the ARM mode or the REC mode go from H to L, and a single image is recorded. Since the minimum frequency of the EST signals is 0Hz (=recording pause), this is compatible with slow speed recording. Also, by inputting exposure signals from other cameras to EST, simple synchronized recording can be performed. (▶� 9-47)

Attention •A "J3 branch cable" (sold separately) (▶▶copy 1-4)is required for EST2 input.

Detailed

7-27

Timing Restrictions for External Synchronization Signals

External synchronization signals (EST signals) must satisfy the following two timing conditions.

- EST signal frequency (Hz) ≤maximum frame rate (frames/sec) for the frame size set
- EST signal frequency (Hz) ≤1/shutter speed (Hz)

Attention
- Select the recording speed settings with a speed close to the frequency of the input EST signals.

  Also, if there is no present value that is close, use a custom frame rate setting.
- Custom setting for the frame rate and frame size. (➠ 4-6 ,4-8)

■Select EST with the Frame Synchronization Method

The two modes of EST and A-EST can be selected for EST synchronization but they are the same two modes for the MEMRECAM ACS-1.
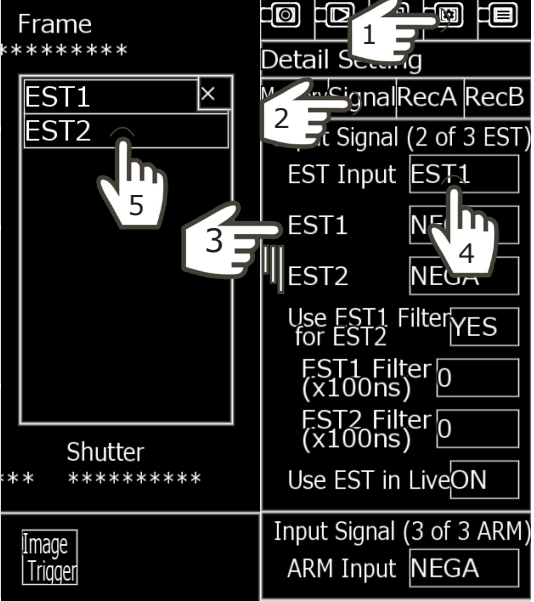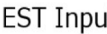
Select the synchronization signals to use (internal synchronization, external synchronization).

	1	Select the detailed settings tab icon
	2	Select inside the RecA tab box
RecA	3	Slide inside the box under the RecA tab
Frame Synchronization	4	Select the box under Frame Synchronization •A popup window is displayed
	5	Select the following items in the popup window. Select EST/A-EST.

•EST Sync	EST synchronization
•A-EST Sync	A-EST synchronization

■Select the EST (External Synchronization Signals) Channel

Select the EST channel to use.

■[⚙]	1	Select the detailed settings tab icon
	2	Select inside the Signal tab box
Signal	3	Slide inside the box under the Signal tab
EST Input	4	Select the box to the right of EST Input •A popup window is displayed
	5	Select the desired item in the popup window Select EST1 or EST2. 　•EST1 　•EST2

CHECK •Refer to "EST Filter Settings" (▸🕮 7-17) for external synchronization signals filter settings.

Attention •If selecting external synchronization signals, get the black balance using the external synchronization signals.
If external synchronization is not input, do not get the black balance.

7-30

■Connect the EST (External Synchronization Signals)

Connect to EST

Synchronization signals used: EST1 signals

- •TTL level, 5V pullup, insulated, voltage tolerance: -0.5 to 5.5VDC
- •EST signal circuit (▸▥ 9-51) , EST1 input (EST connector) specifications (▸▥ 10-61)
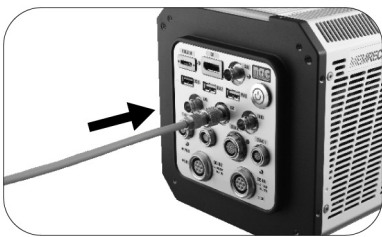
1 Connect the BNC cable to the EST connector

- •Connect the BNC cable to the EST connector.
- •Connect the other end of the BNC cable to the output device for exposure start signals.

Connect to EST2

Synchronization signals used: EST2 signals

•TTL level, 5V pullup, insulated, voltage tolerance: -0.5 to 5.5VDC

•EST signal circuit (▸▥ 9-51) , EST2 input (REMOTE connector) specifications (▸▥ 10-58)
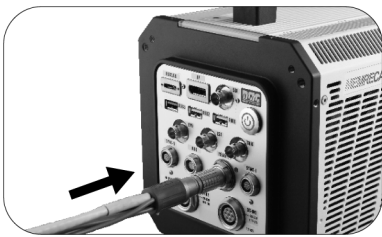
1 Connect the J3 branch cable to the REMOTE connector

- •Connect the J3 branch cable (sold separately) to the REMOTE connector. (▸▥ 1-4)

Blue
P32<EST2>
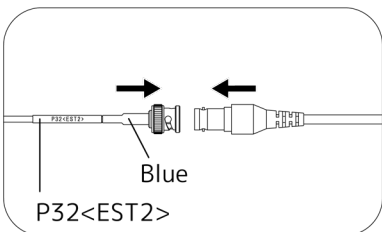
2 Connect the BNC cable (female) to the EST2/EVENT input of the J3 branch cable

- •Connect the BNC cable to the EST2/EVENT input of the J3 branch cable.
- •Connect the other end of the BNC cable to the output device for exposure start signals.

Detailed

7-31

EST2 / EVENT Signal Recording

Input for the synchronization signals EST2 used can be used as the input for event signal re-cording. If the EST2 is at the L level when the frame exposure is done, the valid event signals are recorded to the frame, and "EVENT input mark" is shown during playback.
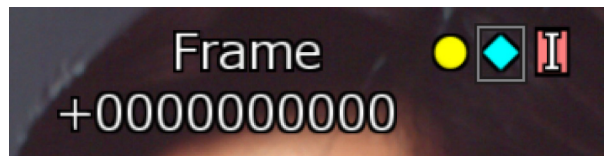
Recording of event signals is automatically performed, and there is no setting to switch the function to enable/disable. Operation is performed regardless of the synchronization setting. The polarity of the event signals utilizes the setting for the EST2 polarity. Select the polarity for the external input/output signals. (▸ 7-12)

7-32

■Synchronized Recording with EST Signals

	1	Input the EST signals to the selected EST input terminal Input the EST signals from the selected connector to synchronize exposure to the EST signals.
■◉	2	Select the recording settings tab icon
ARM	3	SWITCH TO THE ARM MODE
REC	4	Input the trigger to end recording •Switch to the REC mode by inputting the trigger key or the external trigger to end recording.

CHECK •The initial setting for the polarity when exposure from the EST starts (the shutter is OPEN) is "L".

The polarity setting cannot be changed.

•Select the polarity for the external input/output signals. (➡ 🔖 7-12)

•If the exposure start (H → L) from the selected external synchronization signals is not input, the image displayed is not updated. Confirm the signals input.

Detailed

Time Synchronized Recording

Recording can be performed by synchronizing the time to the device timer connected to the MEMRECAM ACS-1.

■Select the Time Synchronization

Select either internal synchronization or IRIG-B for the time synchronization.

■[⚙]	1	Select the detailed settings tab icon
RecA	2	Select inside the Signal tab box
	3	Slide inside the box under the RecA tab
Frame Synchronization	4	Select the box under Frame Synchronization •A popup window is displayed

	5	Select the following items in the popup window
		•IRIG/M-HUB Sync:
		    IRIG time synchronization
		•GX-HUB Sync:
		    GX-HUB synchronization

Time Reference	6	Select the box to the right of Time Reference •A popup window is displayed •IRIG/M-HUB Sync: IRIG time synchronization is not required.
	7	Select the desired item in the popup window •Internal Time •IRIG/M-HUB Time •GX-HUB Time

•Refer to the "GX-HUB user's guide" for use by connecting multiple cameras using the GX-HUB.

7-34

(00457)H

■Synchronize the IRIG-B Signals with the Time

•IRIG-B signals (⇒🕮 9-59) , IRIG-B input (REMOTE connector) specifications (⇒🕮 10-58)
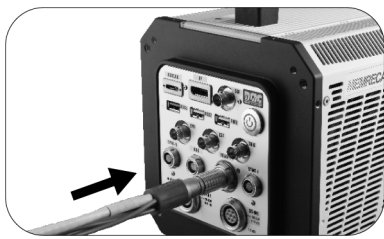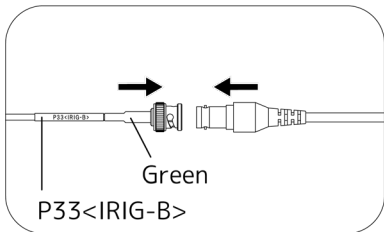
	1 Connect the J3 branch cable to the REMOTE connector •Connect the J3 branch cable (sold separately) to the RE-MOTE connector.
 Green P33<IRIG-B>	**2** Connect the BNC cable (female) to the IRIG-B input of the J3 branch cable •Connect the BNC cable to the IRIG-B input of the J3 branch cable. •Connect the other end of the BNC cable to the output device for the IRIG-B signals and output the IRIG-B signals.
	3 Select IRIG time synchronization •Select IRIG time synchronization on the V-PAD. (⇒🕮 7-34)
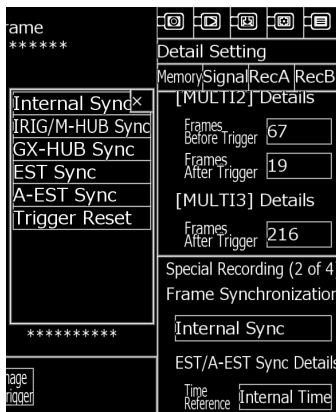
Detailed

Trigger Synchronized Recording

■Trigger Synchronization

A trigger reset is performed with a trigger input using trigger input signals (TRIG1,TRIG2).

1	Connect the external trigger •Input the trigger from the external input/output. (➡🕮 7-12)
2	Select "Trigger Reset" by selecting time synchronization •Select trigger reset on the V-PAD.

Trigger Reset

trigger input signals are entered, re-synchronization is performed and a new exposure starts.
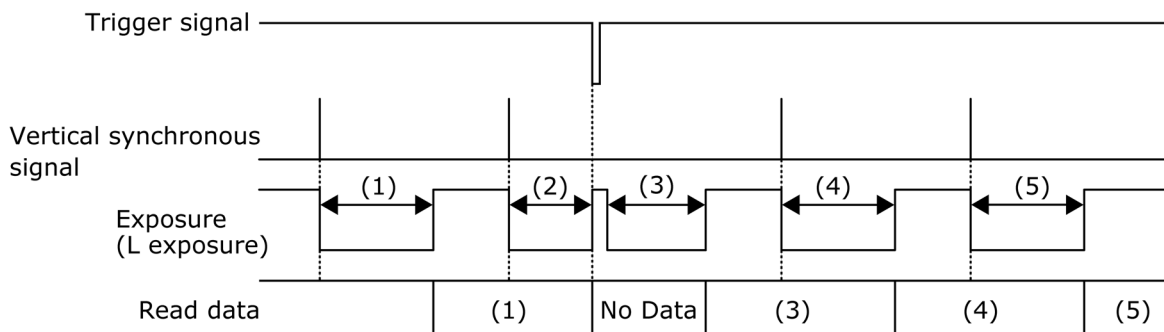
In the figure, a trigger is entered during the (2) exposure period, and a new exposure starts from there (3). The trigger entered in the memory recording (1) is only recorded to midway through the image so it becomes an invalid image. Also, the image during the exposure period (2) does not exist, and the image after (1) becomes the data (3).

Trigger Reset Restrictions

The frame size that can be set for a trigger reset varies according to the pixel bit length.
The restrictions are shown in the following table.

Also, if setting burst recording or MULTI3 recording, depending on the pixel bit length or frame size set, the image may not be updated but the image updates under the following conditions.

Pixel Bit Length	Horizontal Size	Vertical Size Units
12bit	H = 336	V can be set in units of 256
	336 < H ≤ 672	V can be set in units of 128
	672 < H ≤ 1008	V can be set in units of 256
	1008 < H	V can be set in units of 64
10bit	H = 336	V can be set in units of 512
	336 < H ≤ 672	V can be set in units of 256
	672 < H ≤ 1008	V can be set in units of 512
	1008 < H	V can be set in units of 128
8bit	H = 336	V can be set in units of 128
	336 < H ≤ 672	V can be set in units of 64
	672 < H ≤ 1008	V can be set in units of 128
	1008 < H	V can be set in units of 32

H: horizontal pixels, V: vertical pixels

Detailed

Setting the Variable Frame Rate

Variable Frame Rate Function

This is a function that films at the frame rate set for only the number of frames specified after trigger input and before trigger input and after the number of frames specified, slow speed recording is performed. If the action recorded extends for a long time, high speed recording takes place at the desired instant and is a setting that is enabled when simultaneously recording the entire action while recording for a long period of time.

The speed ratio during slow speed recording can be set a 1/integer during normal recording, and the range that can be set is 2 to 100.
Recording is performed at a slow speed until the trigger is input, and after the trigger, recording is performed at the normal frame rate for only the number of frames set. After recording the number of frames set, if there is memory remaining, recording may be performed again at a slow speed until the memory is used.
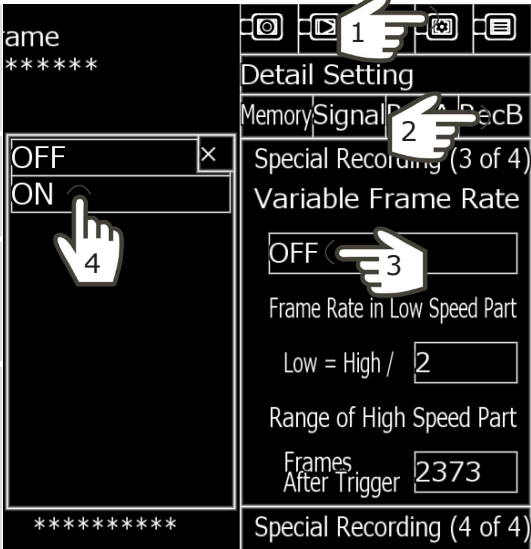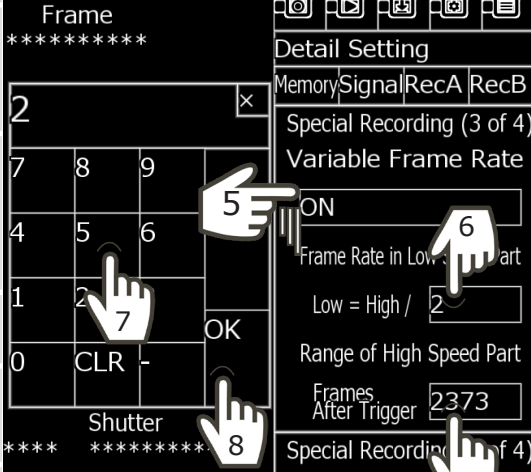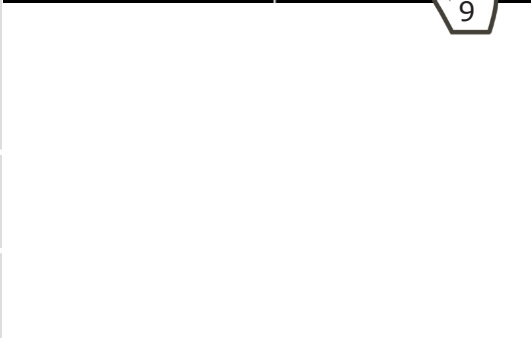
When the frame rate is 5000 frames/sec, and the number of frames recorded at a normal rate is 2501 frames (about 500ms), and the speed ratio during slow speeds is set to 1000 frames/sec for 1/5, the operation is as shown in the following figure.

```
                        TRIGGER
                          ▽
 ──────────────────────────────────────────────────────▶

                 1000pps          5000pps          1000pps
Frame rate  (Low recording speed) (Normal recording) (Low recording speed)

                 0msec              500msec      Last recorded frame
```
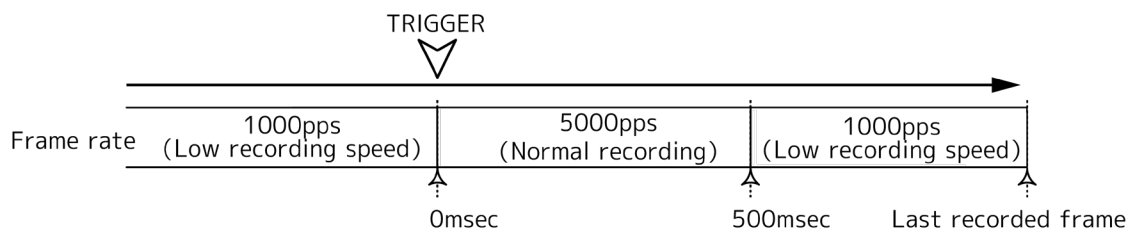
✎ Attention •Even with the EPO (exposure pulse output) at a slow speed, the exposure pulse for the frame rate is output at the same as with normal recording.

•The variable frame rate function is disabled during burst recording.

•The frame rate during normal recording is the set value for the "Frame Rate" (▸▭ 4-5).

■ Using the Variable Frame Rate Function

	1	Select the detailed settings tab icon	
RecB	2	Select inside the RecB tab box	
	3	Select the box under Variable Frame Rate •A popup window is displayed	
Variable Frame Rate	4	Select the desired item in the popup window •Select ON/OFF	
RecB	5	Slide inside the box under the RecB tab	
	6	Select the box to the right of Low = High / •A keypad is displayed	
Low = High /	7	Input using the keypad	
	8	Input OK on the keypad	
	9	Select the box to the right of Frames After Trigger •A keypad is displayed	
Frames After Trigger	7	Input using the keypad	
	8	Input OK on the keypad	

Detailed

7-39

Recording for PIV (Particle Image Velocimetry)

■ Recording for PIV (Particle Image Velocimetry)

PIV (Particle Image Velocimetry) is a technology to quantitatively measure the velocity distribution of the flow from the movement of particles, based on tracking the flow of particles that are mixed in a flow of gas and liquids.

Frame straddling is used for PIV and is a method of recording two images at once with exposures of laser light for a very short time interval around the change of frames. With frame straddling on the ACS-1, recording of two frames (1st frame and 2nd frame) is possible with a single exposure start signal.
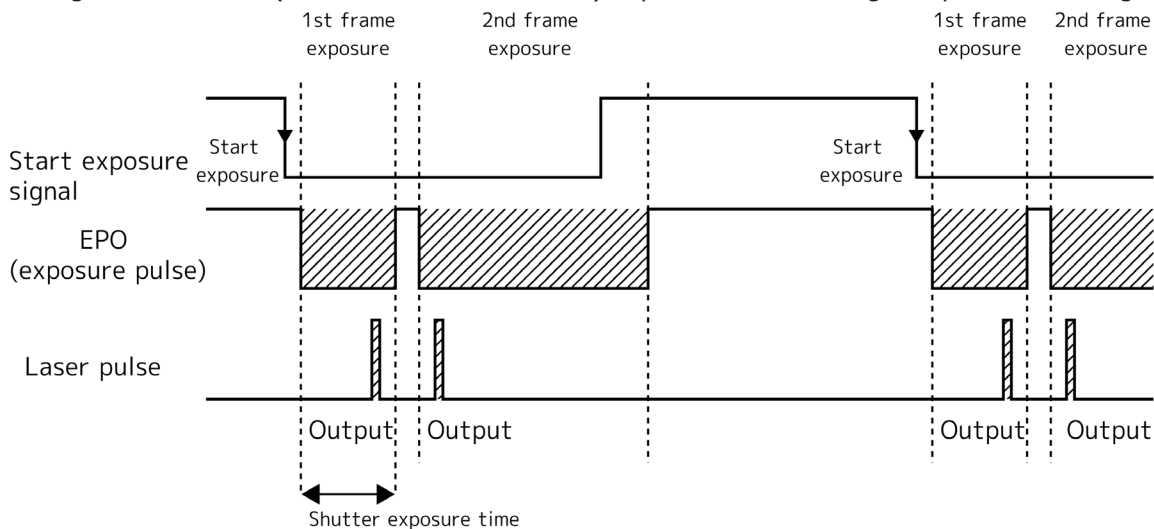
The timing to switch from the 1st frame to the 2nd frame is adjusted by changing the exposure time of the 1st frame with the shutter speed setting. The exposure time for the 2nd frame is determined by the frame size, and cannot be changed.

You can confirm the exposure pulse signal (EPO) output for the exposure time.
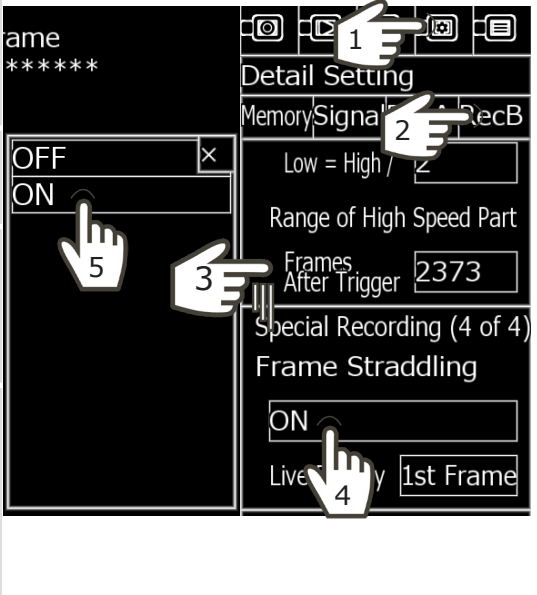
Frame rate for frame straddling

- Frame rate that can be set depends on the shutter speed.
- You can increase the Frame rate by shortening the shutter speed.
- The settable Frame rate range for the set shutter speed is displayed below the "Frame Rate".

Select either internal synchronization or EST synchronization for the camera synchronization.

- If synchronizing the laser pulse timing using the EPO output signals from the camera as the standard, set the synchronization setting to "internal synchronization". Set the frame rate with the camera.
- If there are reference signals separate from the camera, set the synchronization setting to "EST synchronization", and synchronize the timing of the camera and the laser pulse to the reference signal. Since 2 frames are recorded for the reference signal, the Frame rate is twice the frequency of the reference signal.
- Film synchronized to the external signals (EST). (➤📖 7-27)

■Frame Straddling

	1	Select the detailed settings tab icon
RecB	2	Enable frame straddling.
	3	Slide inside the box under the RecB tab
Frame Straddling	4	Select the box under Frame Straddling •A popup window is displayed
	5	Select the desired item in the popup window Select frame straddling ON/OFF. •OFF Normal recording. •ON Frame straddling.
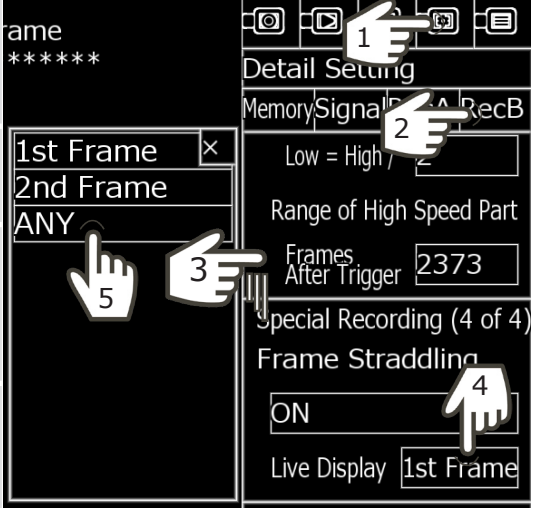
Detailed

Attention
•The following restrictions apply to the use of the frame straddling function.
•The restrictions for the relationship between the frame rate and the frame size differ from the normal restrictions (frame straddling OFF) for the exposure time.
•With external synchronization, the cycle for the EST signals (exposure start signal)> frame rate/2
•The frame rate is the speed of "magnitude of 20 at 100 or more (for internal synchronization)".
•If the select synchronization setting is "Trigger Reset", or if the variable frame rate is ON, recording with frame straddling is not possible.
•If recording with partitioned segments, up to 8 segments can be used.

■Select the Display Image for Frame Straddling

■⚙	1	Select the detailed settings tab icon	
	2	Select inside the RecB tab box	
RecB	3	Slide inside the box under the RecB tab	
Live Display	4	Select the box under Live Display •A popup window is displayed	
	5	Select the desired item in the popup window Select the frame to be displayed live during frame straddling.	
		•ANY	Live display of the latest image without distinguishing between the 1st frame and the 2nd frame
		•1st	Live display of the latest image for the 1st frame
		•2nd	Live display of the latest image for the 2nd frame

Frame
******

Detail Setting

Memory Signal RecB

Low = High / 2

Range of High Speed Part

Frames After Trigger 2373

Special Recording (4 of 4)

Frame Straddling

ON

Live Display 1st Frame

1st Frame ×
2nd Frame
ANY

Select the Pixel Bit Length

The number of bits per pixel in the recorded image can be changed. If the number of bits increases, the gradient of the image (the amount of change in brightness) becomes finer, and becomes a high quality image with a smooth gradient. If the number of bits decreases, the gradient of the image becomes rougher but it is possible to extend the recording memory and the time for recording.

Set the Pixel Bit Length
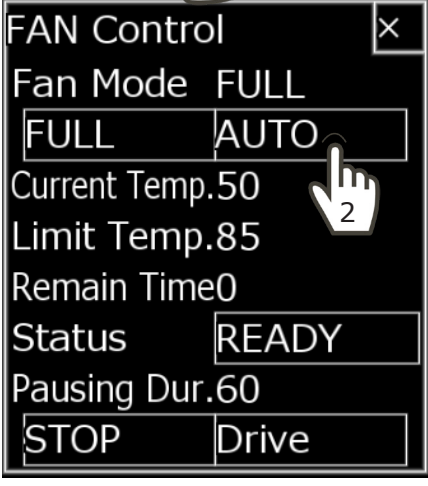
Select from the 3 bit lengths of 12bit, 10bit and 8bit.

■▶⚙	1	Select the detailed settings tab icon
RecB	2	Select inside the RecB tab box
	3	Slide inside the box under the RecB tab
Live Display	4	Select the box to the right of Pixel Bit Length •A popup window is displayed

	5	Select the desired item in the popup window
		Select the pixel bit length.
		   •8bit (Long time)
		   •10bit (Time)
		   •12bit (High quality image)

Detailed

Change fan control

■ Change fan control

F A N	1	Display the fan control window.	
AUTO	2	Select the fan control method. AUTO (Automatic fan control mode): Monitors the temperature inside the camera and automatically controls the fan speed As the temperature increases, the fan speed also increases. The cooling fan cannot be stopped	
FULL	3	FULL (Forced cooling mode) Maximum fan speed is forcibly set. The cooling fan can be stopped.	

7-44

■Stop the fan

	1	Stop fan at FULL. (Forced cooling mode) i.Press the numeric part of [Pausing Dur.] to specify the stop time (in seconds). ii.Press the [STOP] button to stop the cooling fan until the specified time elapses or the temperature in the camera reaches the upper limit[Limit Temp.] before the lapse of time. Press Button [Drive] to cancel the fan stop and activate the fan.	
	2	Fan Mode: Current fan control mode FULL/AUTO: Mode selecting button Current Temp.: Current in-camera temperature (No setting) Limit Temp.: Upper limit temperature (No setting) Remain Time: The remaining time of fan stop(No setting) Status: COOL(During cooling)/READY (Fan can be stopped) /PAUSE (Fan is stopped) (No setting) Pausing Dur.: Fan stop time STOP/DRIVE: Fan stop/operation button	

Detailed

7-45
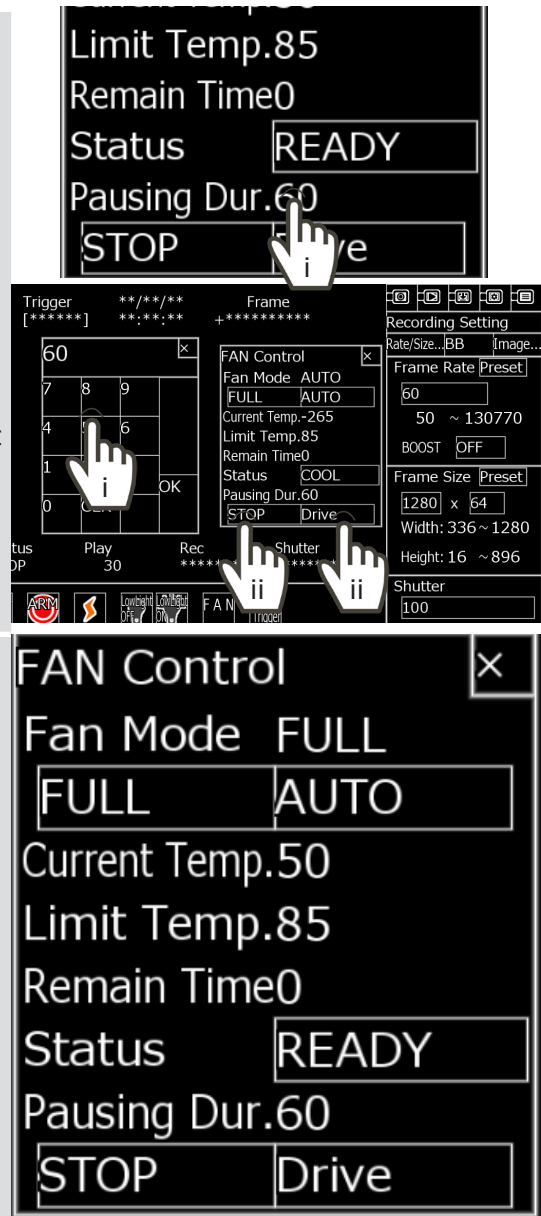
8

System (Utility) Settings

System

Items that Can Be Set with System (Utility)

You can check the IP address, check the hardware revisions and firmware version, return to the factory settings, and make changes to the frame display information in the recording information.

■▤ Utility

■ Utility

Items that can be set with the Utility tab after selecting the utility tab icon.
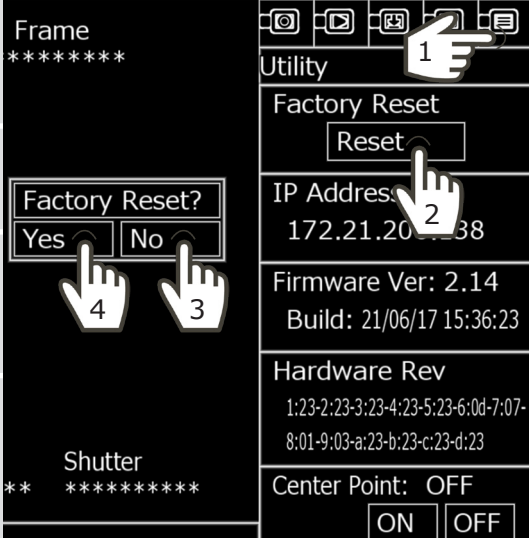
	Setting	Details	⏩📖
Utility	Factory Reset	•Return the settings for the camera to the factory settings	8-3
	IP Address	•Show the IP address	8-6
	Firmware Ver	•Show the firmware version information	8-6
	Hardware Rev	•Show the hardware revision information	8-6
	Center Point	•ON/OFF	8-4
	Frame Format	•Change the method of showing the frame information	8-5
	Model	•Display camera model	

Utility

Factory Reset
Reset

IP Address
172.21.200.138

Firmware Ver: 2.14
Build: 21/06/17 15:36:23

Hardware Rev
1:23-2:23-3:23-4:23-5:23-6:0d-7:07-8:01-9:03-a:23-b:23-c:23-d:23

Center Point: OFF
ON   OFF

Frame Format
Frame No

Model
ACS-1 M60

8-2

Return to the Factory Settings

Execute a Factory Reset to return to the factory settings and delete the recorded data.

Attention •Make sure to save data before executing a Factory Reset.

■Execute a Factory Reset

	1	Select the utility tab icon
	2	Select Factory Reset
Factory Reset	3	Select No •Suspend the Factory Reset.
	4	Select Yes •Execute the Factory Reset.

Frame
****

Factory Reset?
Yes   No

4   3

Shutter
**   *********

Utility
Factory Reset
Reset
1
2
IP Address
172.21.20..38
Firmware Ver: 2.14
Build: 21/06/17 15:36:23
Hardware Rev
1:23-2:23-3:23-4:23-5:23-6:0d-7:07-
8:01-9:03-a:23-b:23-c:23-d:23
Center Point: OFF
ON   OFF

System

(00457)H

Show the Image Center Mark

Show the mark (CAFM: Camera Alignment Fiducially Mark) to find the center of the image.

■Set the Image Center Mark to Show/Hide

Show the mark indicating the center of the image as a guide for recording and playback. Select from the image center mark settings of hide (OFF) or show (ON).

■▮▤	1	Select the utility tab icon
Center Point	2	Select the box under Center Point Select the display for the image center mark. •ON Show •OFF Hide
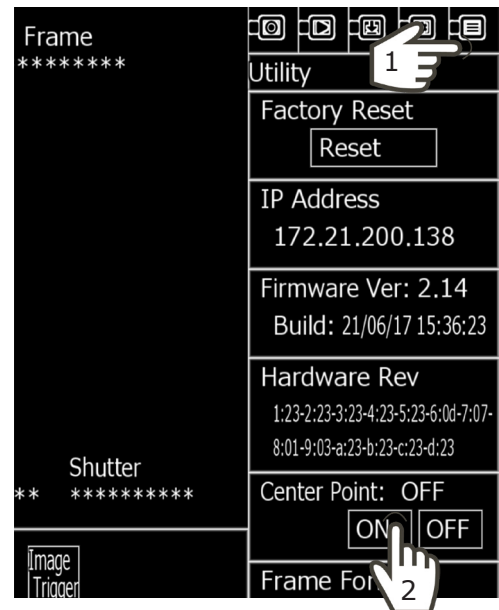
OFF
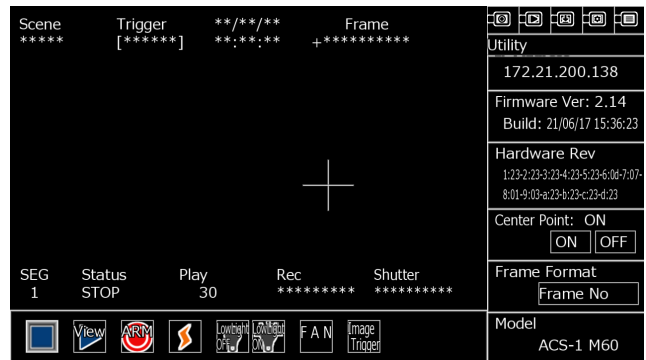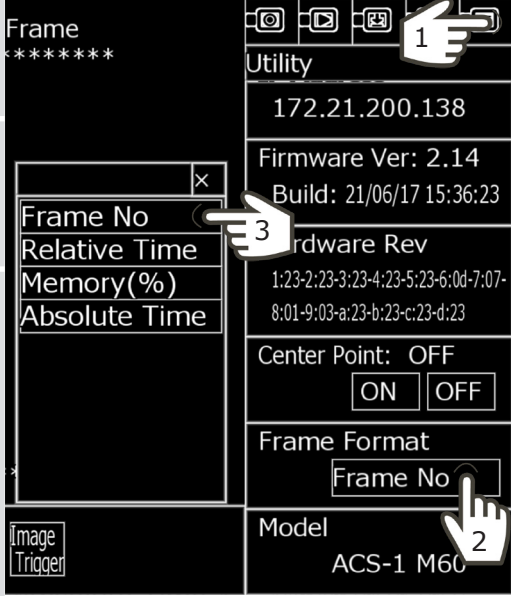
ON
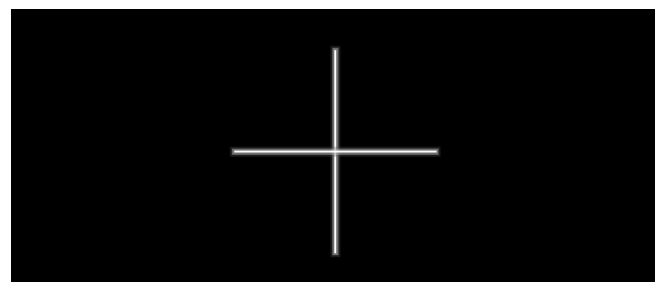
Enlarged center mark

8-4
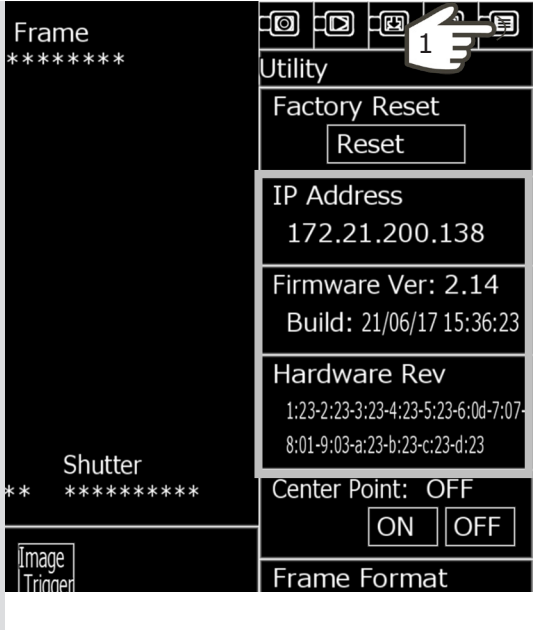
Change the Frame Format

■ Change the Frame Format for the Recording Information Shown

	1	Select the utility tab icon	
	2	Select inside the box under Frame Format •A popup window is displayed	
	3	Select the desired item in the popup window •Frame No : Frame number •Relative Time: Relative time •Memory (%): Memory remaining •Absolute Time: Absolute time	

System

8-5

Check the IP Address, Firmware and Hardware Revisions

■Check the IP Address, Firmware and Hardware Revisions

� icon	1	Select the utility tab icon •IP address: Shows the current IP address. •Firmware Ver: Shows the firmware version information. •Hardware Rev : Shows the hardware revision information.	Frame ******** Utility Factory Reset — Reset IP Address 172.21.200.138 Firmware Ver: 2.14 Build: 21/06/17 15:36:23 Hardware Rev 1:23-2:23-3:23-4:23-5:23-6:0d-7:07-8:01-9:03-a:23-b:23-c:23-d:23 Center Point: OFF ON OFF Shutter ********** Image Trigger Frame Format

(00457)H

9

Other

Other

List of Menu Items

List of the items that can be set from the selection box in the V-PAD tab. Items in bold are the factory settings.

■Recording Settings (Recording Settings > Rate/Size...)

Frame Rate	**25000** (ACS-1 M30/M30E) **35000** (ACS-1/ACS-1 M40/M40E) **54000** (ACS-1 M60/M60E) Frame rate settings
BOOST	**OFF**, x2 , X4 Boost mode setting
Frame Size	**1280 896** Frame size settings
Shutter	100 to 500k, **OPEN**, CUSTOM Shutter speed settings
Auto Exposure	**OFF**, ON Auto exposure settings
Auto Exposure Area	**FULL**, CENTER, UPPER, LOWER, LEFT, RIGHT, CUSTOM Auto exposure area settings
Auto Exposure Level	LOW, **MID**, HIGH Auto exposure level settings
Trigger Timing	START, **CENTER**, END, CUSTOM Trigger timing settings

(00457)H

■ Recording Settings （Recording Settings > BB）

Calculate BB	**Calculate BB** Calculate the black balance
Calculate BB Apply at Live	**ON**, OFF Apply the black balance setting at Live
Calculate BB Apply at Play	**ON**, OFF Apply the black balance setting at Play
Auto BB Calculation	**ON**, OFF Auto black balance settings
Auto BB Calculation Starting Live	**ON**, OFF Apply the auto black balance at Live
Auto BB Calculation Starting ARM	**ON**, OFF Apply the auto black balance at ARM start
Auto BB Calculation Rec Completed	**ON**, OFF Apply the auto black balance when recording is done
Auto BB Calculation Frame Rate / Size Change	ON, **OFF** Apply the auto black balance when the frame rate/frame size is changed
Auto BB Calculation Power On	ON, **OFF** Apply the auto black balance when the camera is started up
Auto BB Calculation LowLight Changed	**ON**, OFF Apply the auto black balance when changing the low light setting

Other

(00457)H

■Recording Settings　(Recording Settings > Image...)

Image Correction Luminance	LINEAR, **NORMAL**
	Luminance properties settings
NORMAL Details Gain	**LOW**, MID, HIGH
	Gain settings for recording
NORMAL Details Gamma	OFF, **LOW**, MID
	Gamma settings for recording
NORMAL Details Knee	OFF, **ON**
	Knee settings for recording
NORMAL Details Enhance	OFF, **LOW**, MID, HIGH
	Enhance settings for recording
NORMAL Details White Balance	3100K, 5000K, 9000K, **Auto**, Reg
	White balance settings for recording
NORMAL Details Chroma	**0**(Mono), 50, **100**(Color), 150, 200
	Chroma settings for recording
NORMAL Details RGBMatrix	**OFF**, ON
	RGB matrix settings for recording

■ Play Settings (Play Settings > Operation)

Play Control Segment	**1** to 32
	Playback segment settings
Play Control Block	**0**
	Playback segment settings
Play Control Play Range	**0**
	Playback range settings
Play Control Loop	**OFF**, ON
	Loop playback settings
Play Control Play Rate	-1920fps to 1920fps (**30fps**)
	Playback rate settings
Play Control FrameNo	**0**
	Playback start position settings

■ Play Settings (Play Settings > Image...)

Image Correction Luminance	LINEAR, **NORMAL**
	Luminance properties settings
NORMAL Details Gain	**LOW**, MID, HIGH
	Gain settings for playback
NORMAL Details Gamma	OFF, **LOW**, MID
	Gamma settings for playback
NORMAL Details Knee	OFF, **ON**
	Knee settings for playback
NORMAL Details Enhance	OFF, **LOW**, MID, HIGH
	Enhance settings for playback
NORMAL Details White Balance	3100K, 5000K, 9000K, **Auto**, Reg
	White balance settings for playback
NORMAL Details Chroma	**0**(Mono), 50, **100**(Color), 150, 200
	Chroma settings for playback
NORMAL Details RGBMatrix	**OFF**, ON
	RGB matrix settings for playback

Other

(00457)H

■Save Settings

USB save	START, STOP Start and stop USB save
Remaining Frames	Show the number of frames remaining while saving
File Name	Show file name
File Type	**MCFF**, AVI, MJPEG Settings by USB saved file type
AVI Quality	**75** AVI compression quality settings
Play Rate	Playback rate settings for the USB saved file
Save Frame Range	**Same as Play Range**, Set Manually Save range settings
Save Frame Range Range	**0** Save range settings

■Detail Settings （Detail Settings > Memory）

Number of Segments	**x1**, x2, x4, x8, x16, x32, x64 Memory partitioning settings
Active Segment For Recording	**1** Select recording segments
Active Segment For Playing	**1** Select playback segments

■ Detail Settings (Detail Settings > Signal) 1/2

Trigger Selection	**TRIG1**, TRIG2, ANY, BOTH Select the external trigger signal
Detection Method	EDGE, **LEVEL** External trigger detection method settings
TRIG1 Input	**NEGA**, POSI Trigger 1 input polarity setting
TRIG2 Input	Current OFF, **Current ON** Trigger 2 input polarity setting
Use TRIG1 Filter for TRIG2	NO, **YES** Trigger 2 filter selection
TRIG1 Filter (x100ns)	**0** Trigger 1 filter setting
TRIG2 Filter (x100ns)	**0** Trigger 2 filter setting
EST Input	**EST1**, EST2 EST setting
EST1	**NEGA**, POSI EST1 input polarity setting
EST2	**NEGA**, POSI EST2 input polarity setting
Use EST1 Filter for EST2	NO, **YES** EST2 filter selection
EST1 Filter (x100ns)	**0** EST1 filter setting
EST2 Filter (x100ns)	**0** EST2 filter setting
USE EST in Live	OFF, **ON** EST setting during the VIEW mode
ARM Input	**NEGA**, POSI ARM input polarity setting

Other

(00457)H

■Detail Settings （Detail Settings > Signal） 2/2

EPO Output	**NEGA**, POSI
	EPO output polarity setting
ARM Status Output	**NEGA**, POSI
	ARM status output polarity setting
FAULT Status Output	**NEGA**, POSI
	FAULT status output polarity setting
VD OUT Polarity	**NEGA**, POSI
	VD OUT Polarity setting
VD OUT Multiple	x1/4, x1/2, **x1**,x2,x4, x6, x8, x10
	VD OUT Multiple setting
VD OUT Delay[100ns]	**0**
	VD OUT Delay[100ns] setting
TRIG OUT	**OFF**, ON
	TRIG OUT setting
TRIG OUT Polarity	**NEGA**, POSI
	TRIG OUT Polarity setting
TRIG OUT Mode	**CENTER,** THROUGH, DELAY
	TRIG OUT Mode setting
TRIG OUT Delay[100ns]	**0** to 65535
	TRIG OUT Delay[100ns]
In	**ARMCMD**
	General Input setting
OUT1	**FAULT**, ARMSTS, TRIGOUT, VDOUT
	General Output setting
OUT2	**FAULT**, ARMSTS, TRIGOUT, VDOUT
	General Output setting
OUT3	**FAULT**, ARMSTS, TRIGOUT, VDOUT
	General Output setting

(00457)H

■Detail Settings（Detail Settings > RecA）

Recording Trigger Mode	**NORMAL**, NORMAL (A), NORMAL (L), EVENT, EVENT (A), EVENT (L), BURST, BURST (A), BURST (L), MULTI (A), MULTI (C), MULTIS (A), MULTIS (L), MULTI1 (A), MULTI1 (C), MULTI2 (A), MULTI2 (C), MULTI3 (A), MULTI3 (C), LINEAR Recording method selection
[MULTI] Details Blocks	**2** to 64 Setting for the number of blocks for multi-trigger recording
[MULTI1] Details Frames After Trigger	**1** Setting for the number of frames after the trigger for multi-manual 1
[MULTI2] Details Frames Before Trigger	**0** Setting for the number of frames before the trigger for multi-manual 2
[MULTI2] Details Frames After Trigger	**1** Setting for the number of frames after the trigger for multi-manual 2
[MULTI3] Details Frames After Trigger	**0** Setting for the number of frames after the trigger for multi-manual 3
Frame Synchronization	**Internal Sync**, IRIG/M-HUB Sync, GX-HUB Sync, EST Sync, A-EST Sync, Trigger Reset Frame synchronization setting
EST/A-EST Sync Details Time Reference	**Internal Time**, IRIG/M-HUB Time, GX-HUB Time EST input time reference setting

Other

(00457)H

■ Detail Settings（Detail Settings > RecB)

Variable Frame Rate Select	**OFF**, ON Variable frame rate setting
Variable Frame Rate Frame Rate in Low Speed Part	**2** Speed ratio at slow speeds
Variable Frame Rate Range of High Speed Part	Maximum value
Frame Straddling Select	**OFF**, ON Frame straddling setting
Frame Straddling Live Display	**1st Frame**, 2nd Frame, ANY Live display selection during frame straddling
Sensor Pixel Bit Length	8bit, 10bit, **12bit** Pixel bit length setting
Sensor Exposure Timing (Sync with...)	**StartTime**, EndTime Exposure timing setting

■ Utility

Factory Reset	**Factory Reset** Return to factory settings.
IP Address	Show IP address
Firmware Ver	Show camera Firmware revision
Hardware rev	Show camera hardware revision
Center Point	**OFF,** ON Video image center mark setting
Frame Format	**Frame No**, Relative Time, Memory(%) Absolute Time Setting how Frame information is displayed
Model	Display camera model

Superimposed Information Details
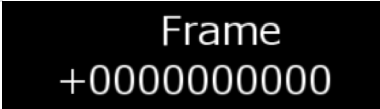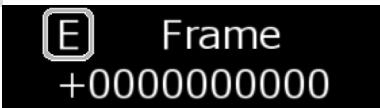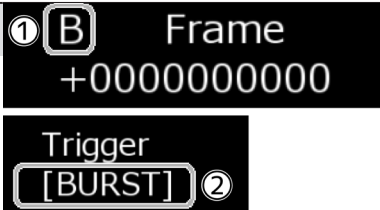
Describes the screen shown and the operation for the normal, burst, event, multi-trigger, multi-manual and linear recording methods. Select the recording method.

■ Show Superimposed Information on the Recording Method

When setting the normal, burst, event, multi-trigger, multi-manual or linear recording methods, the current settings are shown as superimposed information on the image on the monitor.

Frame Counter Display

A letter is shown on the "Frame Counter" to indicate the current recording method.
 (The display does not change immediately after changing the recording method, and the display only changes when switching to the VIEW or ARM mode.)

Normal Recording Method

- A letter indicating the recording method is not shown.
- This shows when "NORMAL", "NORMAL (A)" or "NORMAL (L)" is set.

```
   Frame
+0000000000
```

Event Recording Method

- The letter "E" is shown on the frame counter to indicate that the current method is the event recording method.
- This shows when "EVENT", "EVENT (A)" or "EVENT (L)" is set.

```
E    Frame
+0000000000
```

Burst Recording Method

- The letter "B" (1) is shown on the frame counter to indicate that the current method is the burst recording method.
- Also, "BURST" (2) is shown for the trigger timing.
- This shows when "BURST", "BURST (A)" or "BURST (L)" is set.

```
① B   Frame
+0000000000

Trigger
[BURST] ②
```

Other

(00457)H

Multi-trigger Recording Method
<MULTI (A), MULTIS (A), MULTIS (L)>

- The letter "A" (1) is shown to indicate that the current recording method is the ALLBLOCKS auto block switch.
- During the VIEW mode, the number of blocks partitioned is shown (2), and during the ARM mode, the block number currently written is shown (3).
- During the PLAY mode, the block numbers during playback are shown.
- This shows when "MULTI (A)", "MULTIS (A)" or "MULTIS (L)" is set.

VIEW mode

② 08 A ① Frame
+0000000000

ARM mode

③ 01 A Frame
+0000000000

<MULTI (C) >
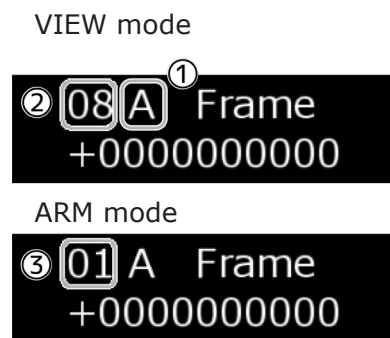
- The letter "C" (4) is shown to indicate the CONTINUOUS auto block switch for the multi-trigger recording method.
- During the VIEW mode, the number of blocks partitioned is shown (5), and during the ARM mode, the block number currently written is shown (6). Furthermore, if the setting for the number of recorded block partitions is reached, the number resets to 01.
- During the PLAY mode, the block numbers during playback are shown.
- This shows when "MULTI (C)" is set.

VIEW mode

⑤ 08 C ④ Frame
+0000000000

ARM mode

⑥ 01 C Frame
+0000000593
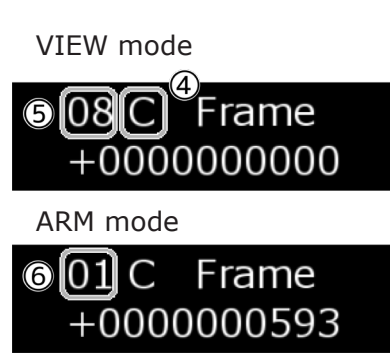
Multi-manual Recording Method
<MULTI1 (A), MULTI1 (C), MULTI3 (A), MULTI3 (C)>

•The letter "A" (or "C") (1) is shown to indicate that the current recording method is the ALLBLOCKS (or CONTINUOUS) auto block switch.
•"Multi1" (or Multi3) (2) is shown as the trigger timing.
•The "Frames After Trigger" setting is shown. (3)
•The block number is not shown.
•During the ARM mode, the frame counter (4) is not shown as single blocks but as the number corresponding to all blocks.
•During the PLAY mode, the frame counter shows the first frame of the top block as the reference (0), and all blocks are shown as a single scene.
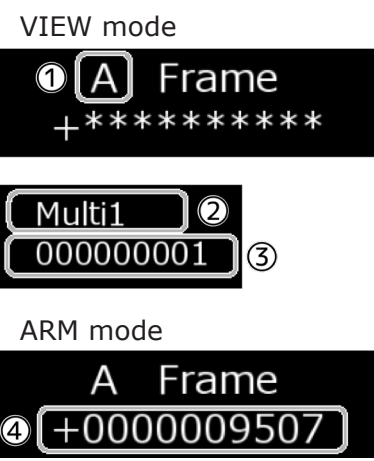
VIEW mode

① A Frame
+**********

Multi1 ②
000000001 ③

ARM mode

A Frame
④ +0000009507

<MULTI2 (A) , MULTI2 (C) >

•The letter "A" (or "C") (1) is shown to indicate that the current recording method is the ALLBLOCKS (or CONTINUOUS) auto block switch.
•"Multi2" (3) is shown as the trigger timing.
•The "Frames Before Trigger" and "Frames After Trigger" settings are shown. (4)
•During the VIEW mode, the number of partitioned blocks is shown (2) and during the ARM mode, the block currently written is shown (6).
•During the ARM mode, the frame counter (5) shows the Frames After Trigger.

VIEW mode

② 64 A ① Frame
+**********

Multi2 ③
0000+0000 ④

ARM mode

⑥ 01 A Frame
⑤ +0000000000

Other

9-13

9-14
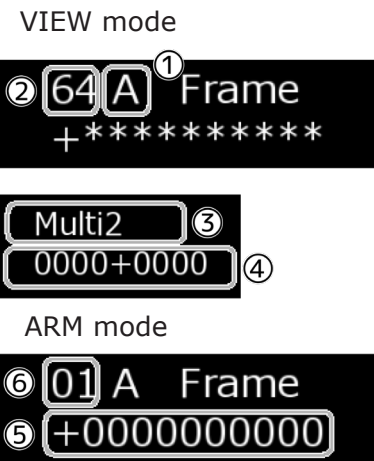
Linear Recording Method

• The letter "L" (1) is shown on the frame counter to indicate that the current method is the linear recording method.
• Also, "LINEAR" (2) is shown for the trigger timing.
• This shows when "LINEAR" is set.

① ⌊L⌋   Frame
     +0000000000

Trigger
[LINEAR] ②
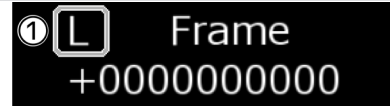
Memory Segment Number Display

A letter is shown on the "Memory Segment Number" to indicate the auto segment switch setting.

No auto segment switch

- A letter indicating the auto segment switch is not shown.
- This shows when "NORMAL", "EVENT", "BURST", "MULTI (A)", "MULTI (C)", "MULTI1/2/3 (A/C)" or "LINEAR" is set.

AUTO segment switchh

- The letter "A" is shown on the memory segment display to indicate that the auto segment switch is set to AUTO.
- This shows when "NORMAL (A)", "EVENT (A)", "BURST (A)" or "MULTIS (A)" is set.

LOOP auto segment switch

- The letter "L" is shown on the memory segment display to indicate that the auto segment switch is set to LOOP.
- This shows when "NORMAL (L)", "EVENT (L)", "BURST (L)", or "MULTIS (L)" is set.

Other

9-15

■NORMAL Recording Method Operation

The NORMAL recording method is a method that records videos input by a single trigger for the selected segment. The three settings of "NORMAL", "NORMAL (A)", and "NORMAL (L)" match the settings for the auto segment switch.

NORMAL

An example of the NORMAL recording method, without the auto segment switch,
Partitioned into 4 segments, recording to segment 1.

Segment 1	Segment 2	Segment 3	Segment 4

(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. After recording is done according to the trigger timing, it switches to the STOP mode.

9-16
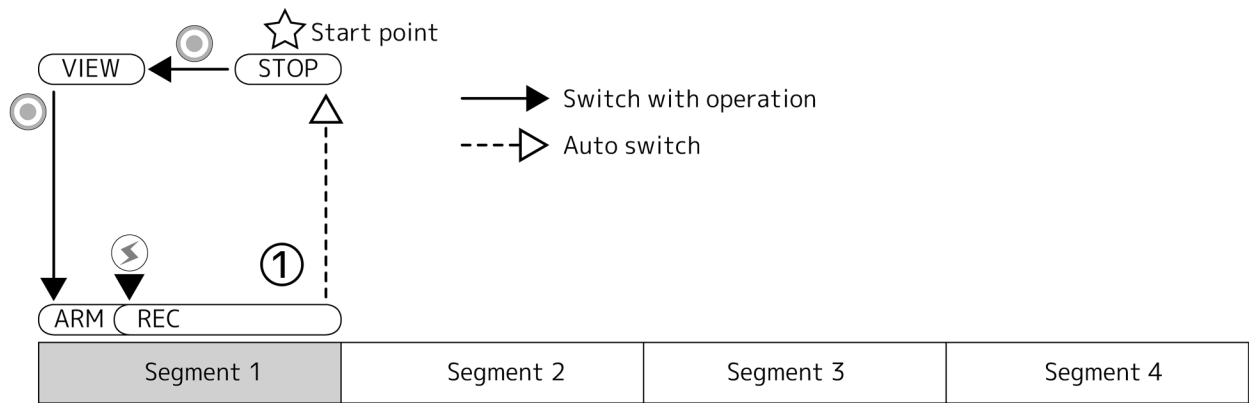
NORMAL(A)

An example of the NORMAL recording method, with the auto segment switch at AUTO, partitioned into 4 segments, performing auto switching to segment 1 according to AUTO.
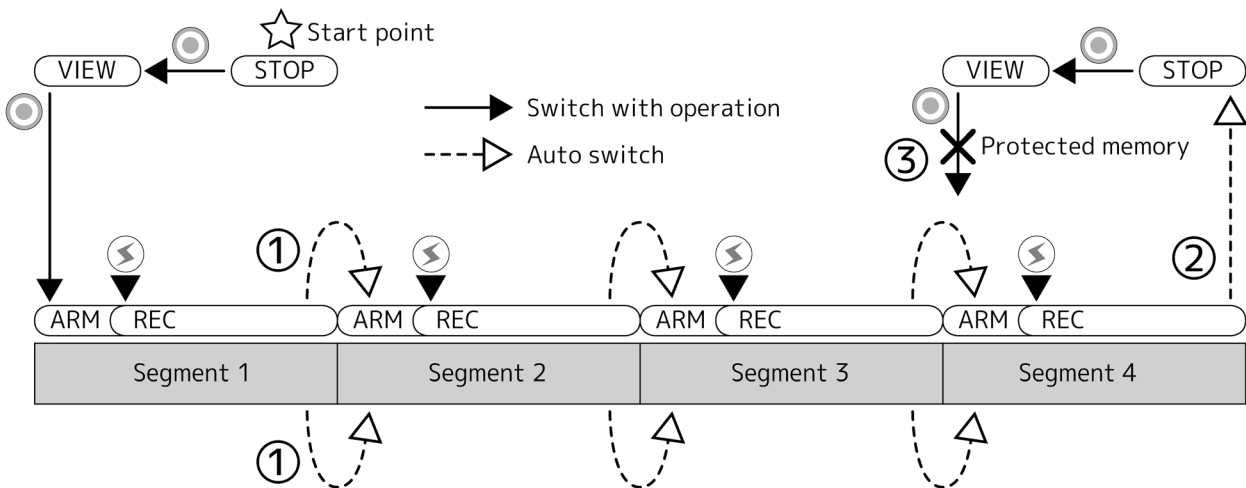
(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. Recording is done according to the trigger timing. Then it automatically moves to the next segment and switches to the ARM mode.
(2)	Once the recording for all of the segments is done, it switches to the STOP mode.
(3)	If the operation switching to the ARM mode is performed again, all of the recorded memory segments are protected and it cannot switch to the ARM mode.

Note: If the operation to switch to the ARM mode is performed when the memory is protected, the following warning message is displayed.

Other
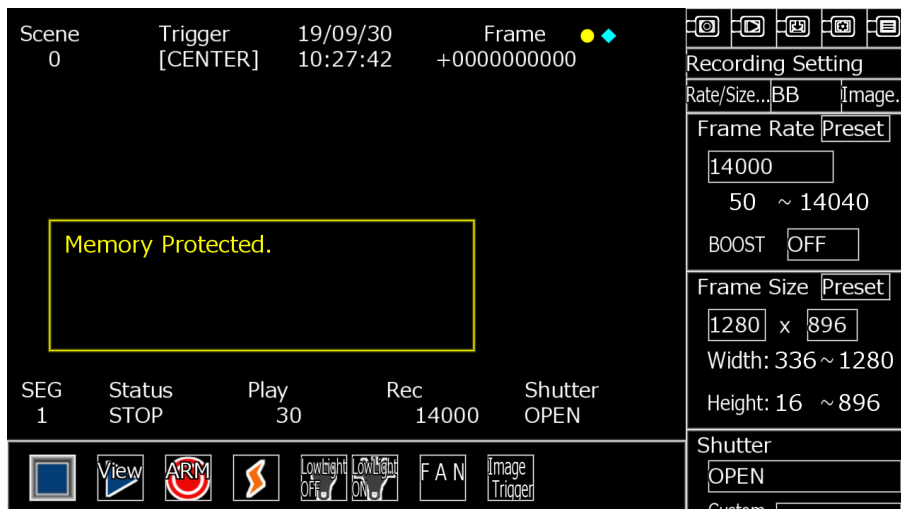
NORMAL(L)

An example of the NORMAL recording method, with the auto segment switch at LOOP, partitioned into 4 segments, switching to segments according to LOOP.
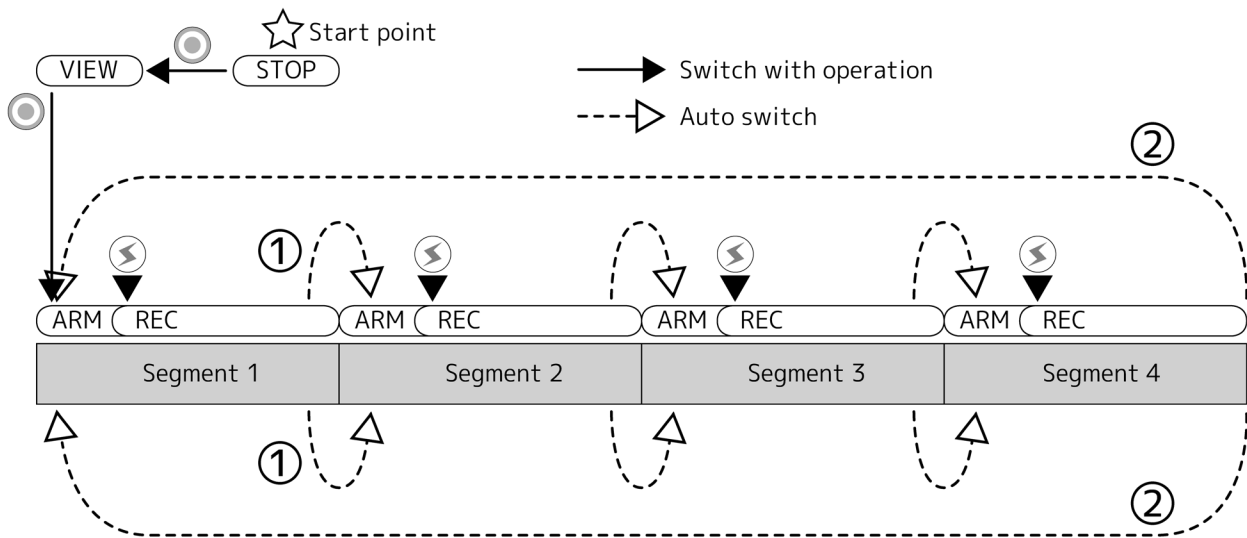
(1)	After switching to the ARM mode, recording is done according to the trigger timing upon trigger input. Then it automatically moves to the next segment and switches to the ARM mode.
(2)	Once the recording for all of the segments is done, it moves to the first segment, and switches to the ARM mode again. (the first memory segment is overwritten.)

If recording is done, press STOP. The image for the segment being recorded is recorded until STOP is pressed.

■ EVENT Recording Method Operation

The EVENT recording method is a method that records videos as well as events, where a single trigger is input for the selected segment and then an external trigger (event trigger) is input for the second and subsequent triggers until the end of recording. During playback, an event mark (a yellow ●) is shown on the frame counter for the frames (event frames) where the event trigger was recorded. The three settings of "EVENT", "EVENT (A)" and "EVENT (L)" match the settings for the auto segment switch.

EVENT

An example of the EVENT recording method, without the auto segment switch, partitioned into 4 segments, recording to segment 1.
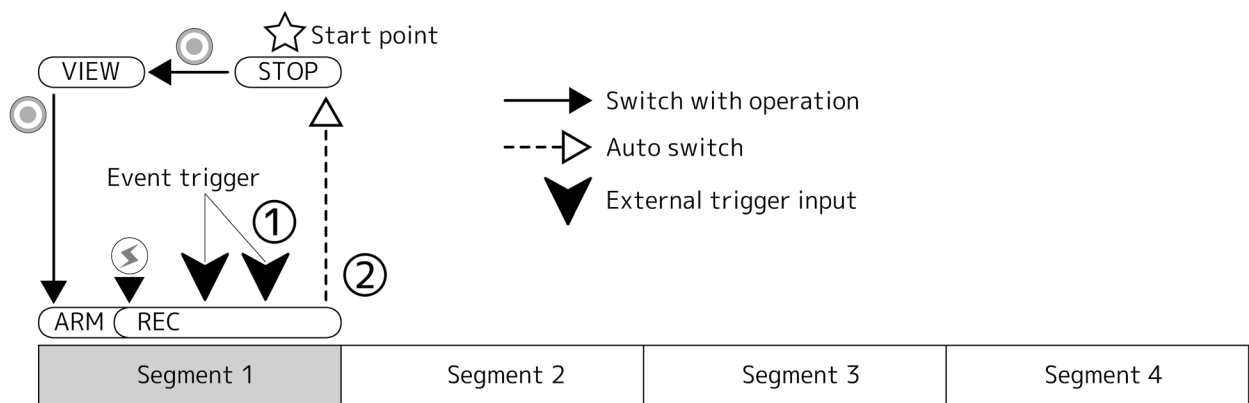
(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. If an external trigger is input before recording ends, it is treated as an event trigger and recorded.
(2)	When recording is done according to the trigger timing, it switches to the STOP mode.

Other

9-19

EVENT(A)

An example of the EVENT recording method, with the auto segment switch on AUTO, partitioned into 4 segments, switching to segments according to AUTO.

(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. If an external trigger is input before recording ends, it is treated as an event trigger and recorded.
(2)	Recording is done according to the trigger timing. Then it automatically moves to the next segment and switches to the ARM mode. The event triggers can be recorded to all segments.
(3)	Once the recording for all of the segments is done, it switches to the STOP mode.
(4)	If the operation switching to the ARM mode is performed again, all of the recorded memory segments are protected and it cannot switch to the ARM mode.

Note: If the operation to switch to the ARM mode is performed when the memory is protected, the following warning message is displayed.

EVENT(L)

An example of the EVENT recording method, with the auto segment switch at LOOP, partitioned into 4 segments, switching to segments according to LOOP.

(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. If an external trigger is input before recording ends, it is treated as an event trigger and recorded.
(2)	Recording is done according to the trigger timing. Then it automatically moves to the next segment and switches to the ARM mode. The event triggers can be recorded to all segments.
(3)	Once the recording for all of the segments is done, it moves to the first segment, and switches to the ARM mode again. (the first memory segment is overwritten.)

If recording is done, press STOP. The image for the segment being recorded is recorded until STOP is pressed.

Other

■BURST Recording Method Operation

The BURST recording method is a method that records videos of frames for the recording time into segments through triggers (burst triggers) from an external input. In the following drawing, one segment is recorded in 3 burst signals. Segments are automatically partitioned into blocks at the valid input time for the burst triggers.

Recording time = burst trigger input time (1+2+3)

| Burst trigger | Burst trigger | Burst trigger |
| Input time 1 | Input time 2 | Input time 3 |

Trigger signal   Valid   Valid   Valid

| Block 1 | Block 2 | Block 3 |
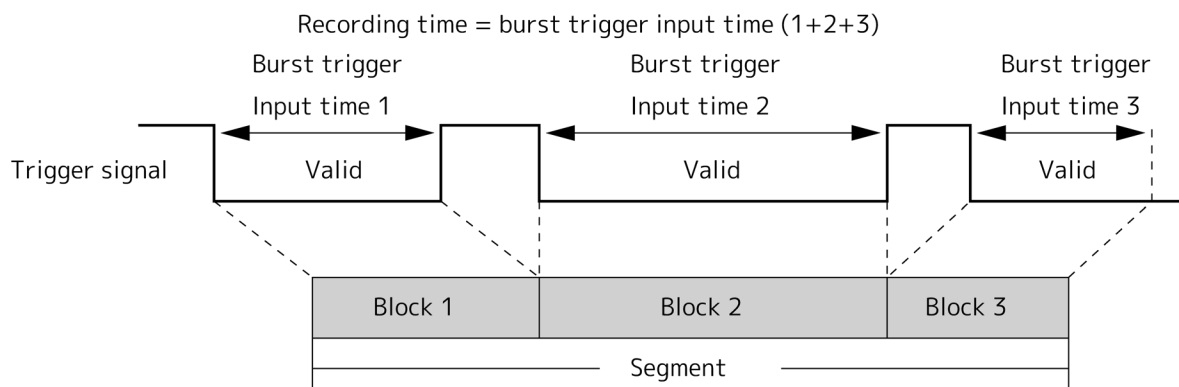
Segment

The three settings of "BURST", "BURST (A)", "BURST (L)" match the settings for the auto segment switch.

Attention
- With the BURST recording method, trigger input cannot be made from the V-PAD. Perform trigger input from the TRIG1 input or the TRIG2 input.
- There are no limits to the number of burst trigger inputs but there can only be up to 64 partitioned blocks (the first frame is recorded, jumping is possible during playback).
- Depending on the settings for frame size and pixel bit length, live updates may not be possible in the ARM mode.
- Refer to the settings for a trigger reset for a live update. (7-36)

BURST

An example of the BURST recording method, without the auto segment switch, partitioned into 4 segments, recording to segment 1.
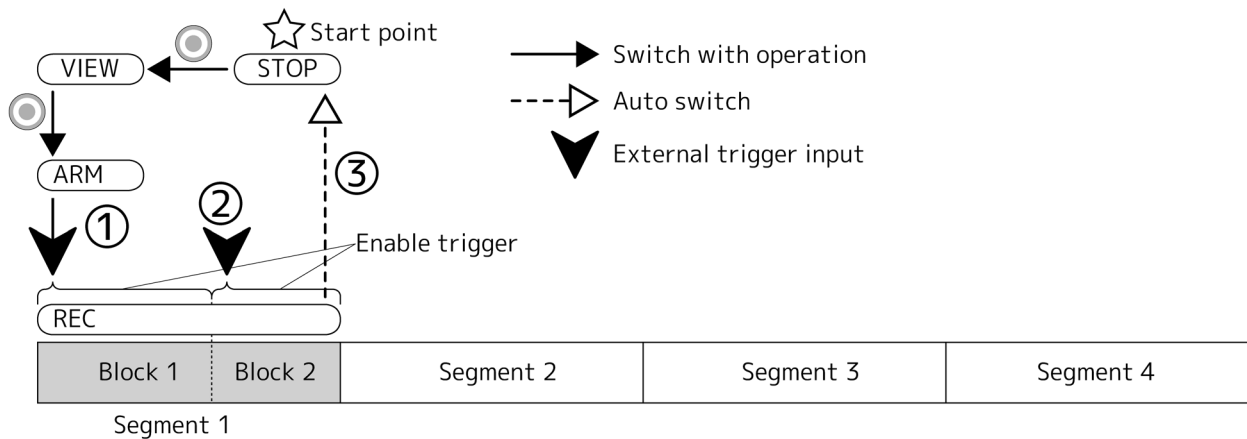
(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input.
(2)	If the trigger input is disabled, blocks are partitioned and the REC mode is paused. If trigger input is enabled again, recording starts again.
(3)	Recording ends once the end of the segment is reached, and it switches to the STOP mode.

Other

(00457)H

BURST(A)

An example of the BURST recording method, with the auto segment switch on AUTO, partitioned into 4 segments, switching to segments according to AUTO.

(1)	After switching to the ARM mode, it switches to the REC mode upon enabled trigger input.
(2)	Recording ends once the end of the segment is reached, and it automatically moves to the next segment and switches to the ARM mode
(3)	Once the recording for all of the segments is done, it switches to the STOP mode
(4)	If the operation switching to the ARM mode is performed again, all of the recorded memory segments are protected and it cannot switch to the ARM mode.

Note: If the operation to switch to the ARM mode is performed when the memory is protected, the following warning message is displayed.

9-24

BURST(L)

An example of the BURST recording method, with the auto segment switch at LOOP, partitioned into 4 segments, switching to segments according to LOOP.

(1)	After switching to the ARM mode, it switches to the REC mode upon enabled trigger input.
(2)	Recording ends once the end of the segment is reached, and it automatically moves to the next segment and switches to the ARM mode
(3)	Once the recording for all of the segments is done, it moves to the first segment, and switches to the ARM mode again. (the first memory segment is overwritten.)

If recording is done, press STOP. The image for the segment being recorded is recorded until STOP is pressed.

Other

■Multi-trigger Recording Method Operation

The multi-trigger recording method is a method that first partitions segments into a maximum of 64 uniform blocks to enable sequential recording of individual multiple images. After block recording, it automatically moves to the next block.

The four settings of "MULTI (A)", "MULTI (C)", "MULTIS (A)", "MULTIS (L)" match the settings for the auto segment switch and the settings for the block switch.

MULTI(A)

An example of the MULTI(A) recording method, with the auto segment (block) switch on ALL BLOCKS, partitioned into 2 segments and 4 blocks, and recording to segment 1.
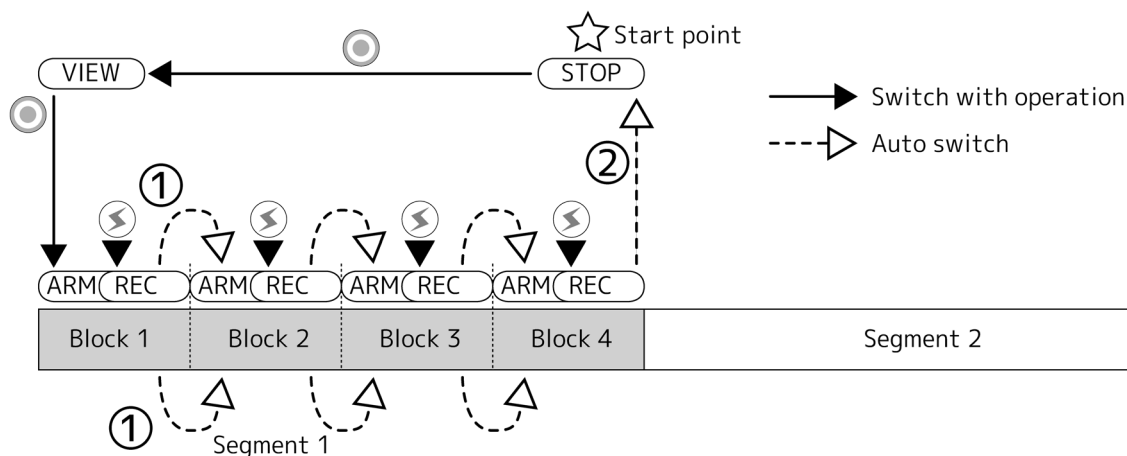
(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. After recording is done according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
(2)	Once the recording for all of the segments is done, it switches to the STOP mode.

MULTI(C)

An example of the MULTI(C) recording method, with the auto segment (block) switch on CONTINUOUS, partitioned into 2 segments and 4 blocks, and recording to segment 1.

(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. After recording is done according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
(2)	Once the recording for all of the blocks is done, it moves to the first block, and switches to the ARM mode again. (the first memory segment is overwritten.) The recorded block number resets to 01.

If recording is done, press STOP. The image for the block being recorded is recorded until STOP is pressed.

Other

(00457)H

MULTIS(A)

An example of the MULTIS(A) recording method, with the auto segment (block) switch on AUTO, partitioned into 2 segments and 4 blocks, and performing auto switching to the segment according to AUTO.

(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. After recording is done according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
(2)	Once the recording for all of the blocks is done, it automatically moves to the next segment, and switches to the ARM mode.
(3)	Once the recording for all of the blocks is done, it automatically moves to the next segment, and switches to the ARM mode.
(4)	If the operation switching to the ARM mode is performed again, the recorded memory segments are protected and it cannot switch to the ARM mode.

Note: If the operation to switch to the ARM mode is performed when the memory is protected, the following warning message is displayed.

Scene	Trigger	19/09/30	Frame	● ◆
0	[CENTER]	10:27:42	+0000000000	

Recording Setting

Rate/Size... BB   Image...

Frame Rate Preset
14000
50 ~ 14040
BOOST OFF

Frame Size Preset
1280 x 896
Width: 336~1280
Height: 16 ~896

Memory Protected.

SEG	Status	Play	Rec	Shutter
1	STOP	30	14000	OPEN

View ARM $ LowLight OFF LowLight ON F A N Image Trigger

Shutter
OPEN
Custom 70028

Other

(00457)H
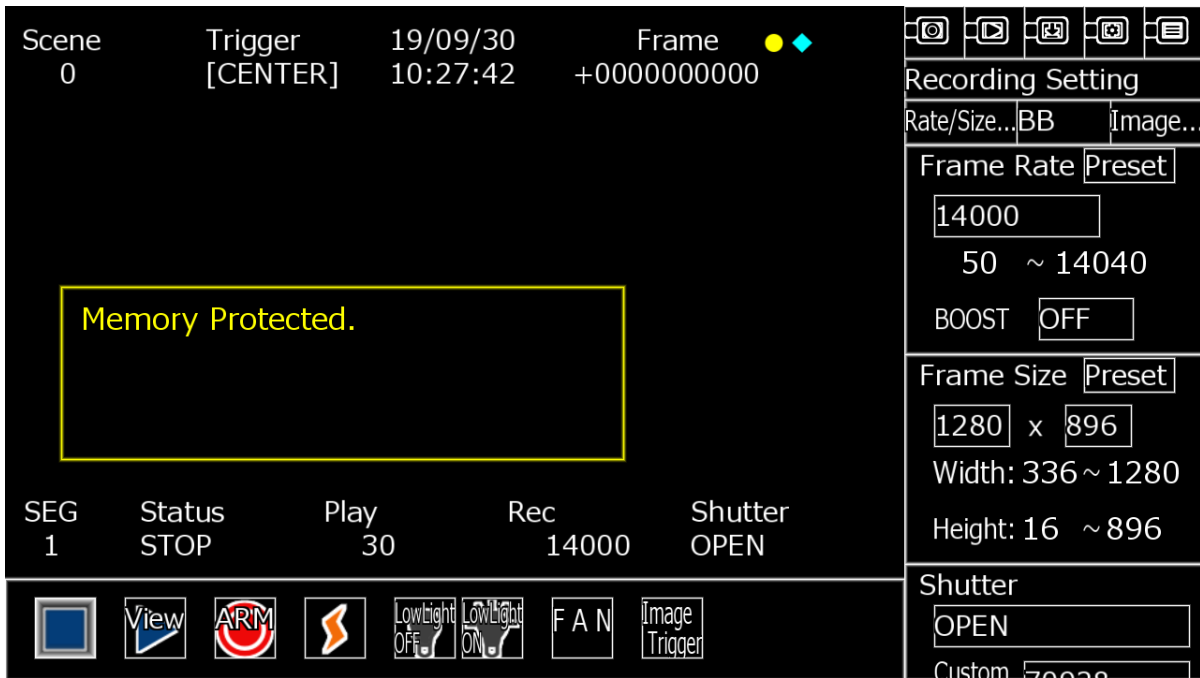
MULTIS(L)

An example of the MULTIS(L) recording method, with the auto segment (block) switch on LOOP, partitioned into 2 segments and 4 blocks, and performing auto switching to the segment according to LOOP.

(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. After recording is done according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
(2)	Once the recording for all of the blocks is done, it automatically moves to the next segment, and switches to the ARM mode.
(3)	Once the recording for all of the segments and blocks is done, it moves to the first segment, and switches to the ARM mode again. (the first memory segment is overwritten.)

If recording is done, press STOP. The image for the segment being recorded is recorded until STOP is pressed.

■Multi-manual Recording Method Operation

The multi-manual recording method is a method that specifies the number of frames per block and enables sequential recording of repeated actions. After block recording, it automatically moves to the next block.

The six settings of "MULTl1 (A)", "MULTl1 (C)", "MULTI2 (A)", "MULTI2 (C)", "MULTI3 (A)", "MULTI3 (C)" match the settings for the block switch.

Attention •There are no settings for the auto segment switch.
•If using external trigger signals with multi-trigger/multi-manual recording, and the "trigger signal detection method" is level, if it moves to the next block with the trigger still in the input state, the trigger is input immediately at the next block and it may not have the expected results.
In this case, set the "trigger signal detection method" to edge.
•Switch the trigger signal detection method to edge

MULTI1

This is a method that synchronizes the exposure start time for the trigger frames and then records after the trigger frame at the frame rate set. Determine the number of blocks (number where a trigger can be input) corresponding to the number of frames per block.

For example, it can be used for injection recording and such when synchronizing the start of the spray.

Example: With 4 frames (including the trigger frame) after the trigger
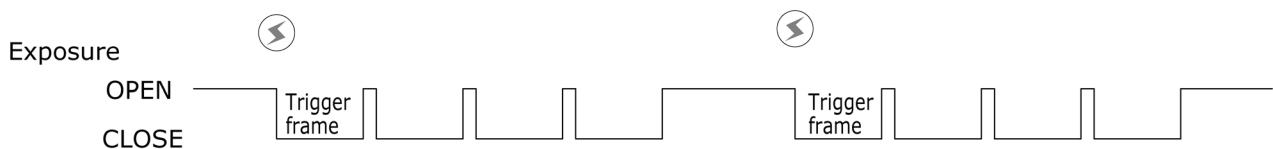
Attention •With each block, it is not possible to go back past the trigger frame to record.
•When not recording, the image on the video monitor is not refreshed.

Other

MULTI1(A)

An example of the MULTI1(A) recording method, with the auto segment (block) switch on ALL BLOCKS, partitioned into 2 segments and recording to segment 1.

(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. After recording is done according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
(2)	Once the recording for all of the blocks is done, it switches to the STOP mode.

MULTI1(C)

An example of the MULTI1(C) recording method, with the auto segment (block) switch on CONTINUOUS, partitioned into 2 segments and recording to segment 1.

(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. After recording is done according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
(2)	Once the recording for all of the blocks is done, it moves to the first block, and switches to the ARM mode again. (the first block is overwritten.)

If recording is done, press STOP. The image for the block being recorded is recorded until STOP is pressed.

MULTI2

This is a method to synchronize any of the internal synchronization/IRIG signals/EST signals and record with the input of trigger signals.

Also, it can be combined with the frame straddling function.

For example, it can be used while recording engine combustion and synchronizing with the angle of the crank rotation or recording a combination of rotors and fluids.

You can record before/after the trigger frame of each block.

Example: With 1 frame before the trigger and 3 frames after the trigger (including the trigger frame)
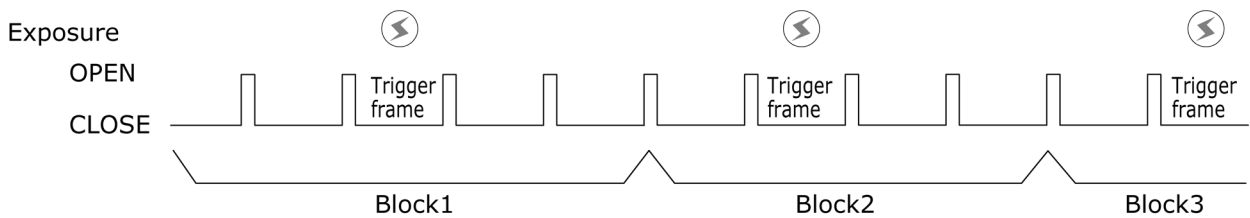
Attention •There can be a maximum of 64 blocks (number where a trigger can be input). Therefore, if there are few frames per block, the entire range of the segment will not be recorded.

MULTI2(A)

An example of the MULTI2(A) recording method, with the auto segment (block) switch on ALL BLOCKS, partitioned into 2 segments, and recording to segment 1.

(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. After recording is done according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
(2)	Once the recording for all of the blocks is done, it switches to the STOP mode.

9-35

Other

MULTI2(C)

An example of the MULTI2(C) recording method, with the auto segment (block) switch on CONTINUOUS, partitioned into 2 segments, and recording to segment 1.

(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. After recording is done according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
(2)	Once the recording for all of the blocks is done, it moves to the first block, and switches to the ARM mode again. (the first block is overwritten.) The recorded block number resets to 01

If recording is done, press STOP. The image for the block being recorded is recorded until STOP is pressed.

MULTI3

This recording method is the same as MULTI2 but it does not have any limitations to the number of trigger inputs.
Determine the number of blocks (number where a trigger can be input) corresponding to the number of frames per block.
However, recording is not possible before the trigger frame.

Example: With 1 frame before the trigger and 3 frames after the trigger (including the trigger frame)

⊘Attention   •Depending on the settings for frame size and pixel bit length, live updates may not be possible in the ARM mode.
•Refer to the settings for a trigger reset for a live update (»🕮 7-36)

9-37
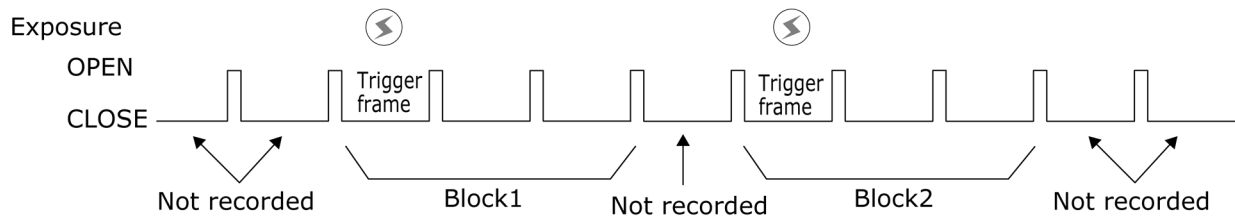
MULTI3(A)

An example of the MULTI3(A) recording method, with the auto segment (block) switch on ALL BLOCKS, partitioned into 2 segments and recording to segment 1.
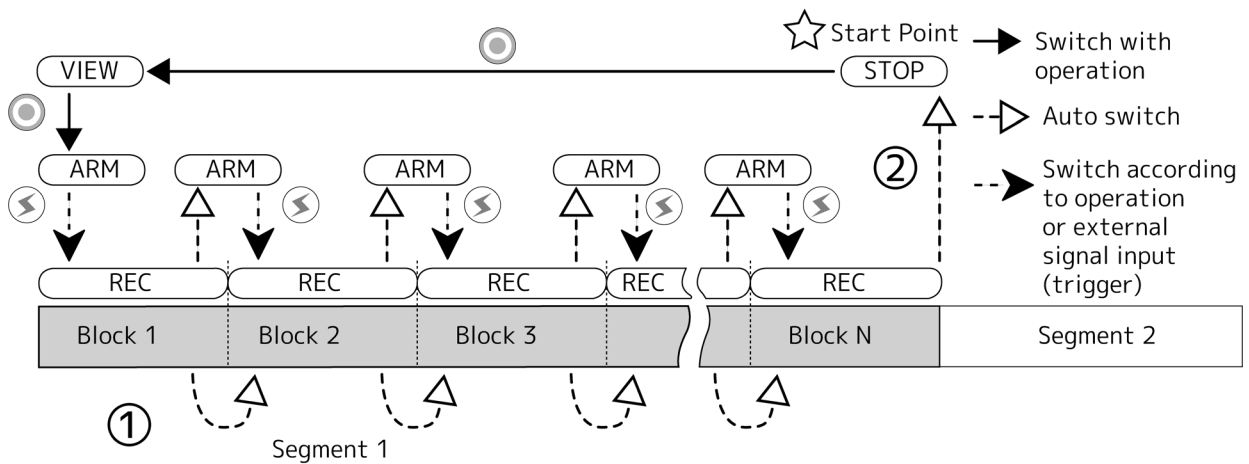
(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. After recording is done according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
(2)	Once the recording for all of the blocks is done, it switches to the STOP mode.

MULTI3(C)

An example of the MULTI3(C) recording method, with the auto segment (block) switch on CONTINUOUS, partitioned into 2 segments and recording to segment 1.

(1)	After switching to the ARM mode, it switches to the REC mode upon trigger input. After recording is done according to the trigger timing, it automatically moves to the next block and switches to the ARM mode.
(2)	Once the recording for all of the blocks is done, it moves to the first block, and switches to the ARM mode again. (the first block is overwritten.)

If recording is done, press STOP. The image for the block being recorded is recorded until STOP is pressed.

Other

■ LINEAR Recording Method Operation

The linear recording method is a method that records videos by controlling the "pause" and "restart" for the recording frames for the recording time to segments through the V-PAD key input.

In the following drawing, recording is performed by two pauses.
Segments are automatically partitioned into blocks during each recording period.
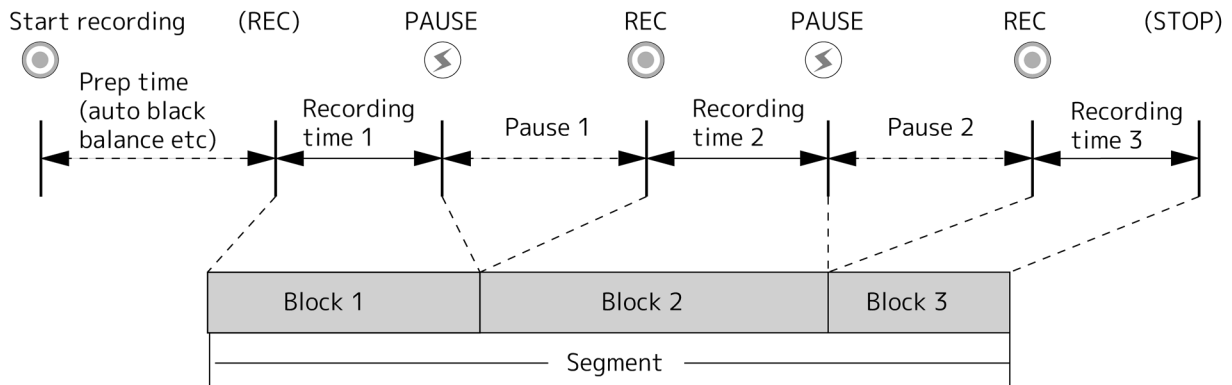
Attention
- There are no settings for the auto segment switch.
- External trigger input cannot be performed with the linear recording method.
- There are no limits to the number of pauses but there can only be up to 64 partitioned blocks (the first frame is recorded, jumping is possible during playback)

LINEAR

An example partitioned into 4 segments and recording to segment 1.
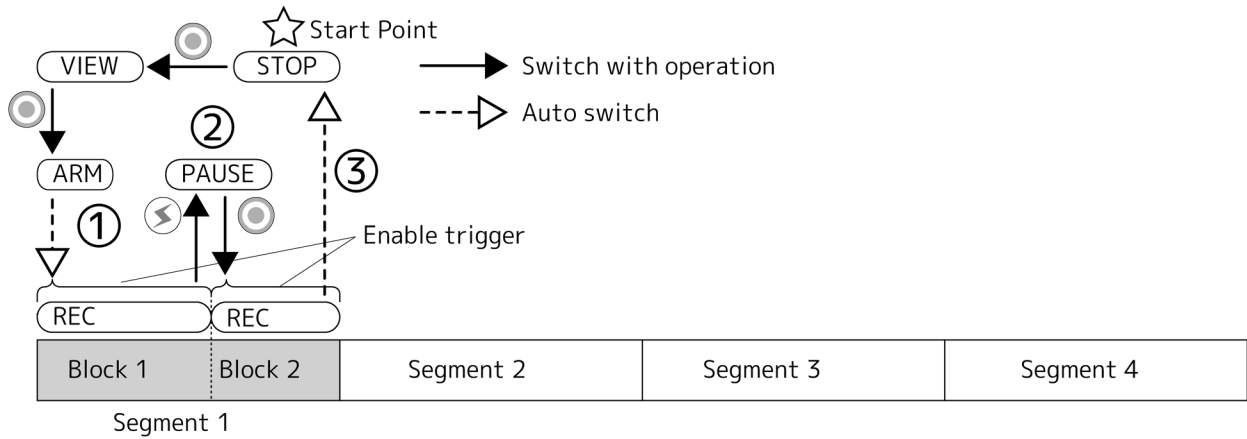
(1)	After switching to the ARM mode, it automatically switches to the REC mode
(2)	With trigger key input, the blocks are partitioned and it waits in the PAUSE mode. Press ARM again to switch to the REC mode and restart recording.
(3)	Recording ends once the end of the segment is reached, and it switches to the STOP mode.

Discrete Control Signal Input/Output

Discrete control signals can be input/output by the GENERAL IN, GENERAL OUT1, GENERAL OUT2 or GENERAL OUT3 of the ACS AUX cable (sold separately).

ARM command input	Switch to the ARM mode.
ARM status output	Output at the L level during the ARM mode, but output at the H level for all others.
FAULT status output	Output at the L level when a warning messages is displayed and during camera startup but output at the H level for all others.
TRIG OUT output	Output at the L level when engaged by trigger input to the camera.
TRIG status output	Indicates that the TRIG is input during ARM mode.
VD OUT output	Signal output for synchronized recording between multiple cameras and devices.

It is possible to sequentially record by using the trigger input, ARM command input and the ARM status output with only signals from the control system connected to the external input/output.

⚠ Attention
- An "ACS AUX cable" (sold separately, only for the ACS series) is required to use the ARM command, ARM status, FAULT status, TRIG OUT, TRIG status and VD OUT.
- Select the signals input/output to GENERAL IN, GENERAL OUT using the MLink or V-PAD.

■ Connect the Discrete Control Signal Input/Output
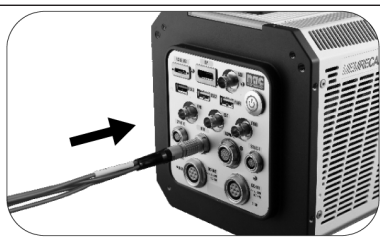
1 Connect the ACS AUX cable to the AUX connector
- Connect the ACS AUX cable (sold separately) to the AUX connector

GENERAL IN
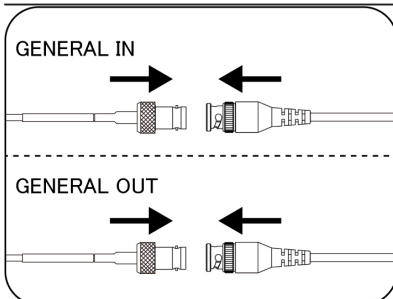
GENERAL OUT

2 Connect the BNC cable to each input/output of the ACS AUX cable
- Connect the BNC cable (male) to the GENERAL IN connector and GENERAL OUT connector of the ACS AUX cable.
- The other end of the BNC cable is connected to the control system device used.

ARM Command (ARM CMD)

ARM command signals
•TTL level, 5V pullup, insulation, allowable voltage range: -0.5 to 5.5VDC
•ARM command input circuit specifications, ARM command connector specifications.
•Valid signal initial settings: ARM command signals detected with the falling edge

■ Use the ARM command to switch to the ARM mode (If the polarity is set to negative)

1   Input the valid signals (falling) for the ARM command
    •Switch from the STOP mode or the VIEW mode to the ARM mode.
    •You cannot switch to the ARM mode during the PLAY mode, LOOP mode, SAVE mode (during USB save) or DOWNLOAD mode (while downloading to MLink) even if an ARM command is input.

ARM Status (ARM STS)

ARM status signals are used to verify if the recording is awaiting the start trigger.

Ⓐttention   •ARM status output circuit specifications (»🕮 9-56), ARM status connector specifications (»🕮 10-56)

•The output signals are signals indicating that it is in the ARM mode and during the ARM mode, either of the L (NEGA) /H (POSI) polarity settings can be selected as the output level.

Example: The polarities of the ARM command input and the ARM status output are negative (»🕮 7-14)

Other

(00457)H
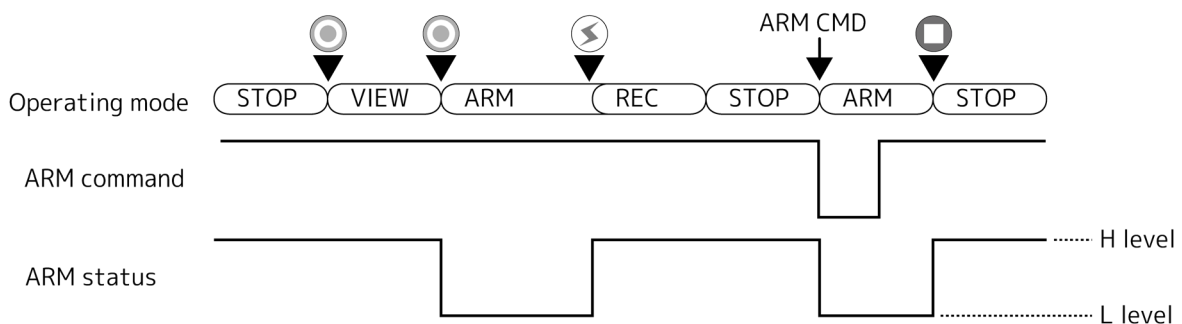
FAULT Status (FAULT STS)

FAULT status signals
•FAULT status output circuit specifications (▸▥ 9-56), FAULT status connector specifications
(▸▥ 10-56)

The FAULT status outputs the L level during the following states (fail state).
•When a warning message is displayed (detection of abnormal setting, failure detection, detection of abnormal power voltage, detection of elevated sensor temperature, detection of abnormal trigger)
•During camera startup (▸▥ 7-14)

The polarity can be change during processing

⊘Attention   •During camera startup, the polarity settings are not reflected but are output at the L level.

■Remove the Warning Message Shown on the Monitor
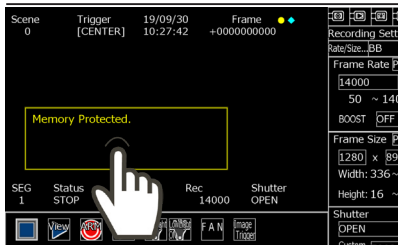
1 Press the warning message on the V-PAD
•Press the warning message to remove the warning message.

The FAULT status will also disable the polarity output when the warning message on the V-PAD screen is removed.

TRIG OUT Output (TRIG OUT)

The TRIG OUT signals are trigger signals generated within the camera that are output.
After detecting any of the following, the trigger signals are generated at the selected output timing.
- •MLink or V-PAD trigger key input
- •External trigger (TRIG1 · TRIG2)
- •Image trigger

Select the trigger signal output timing from the following 3 items.
- •Through
- •Center of the following frame
- •Time delay setting from the start of the following frame

Example: When the time delay from the following frame is set to 5µs (Example when all of the signals have negative polarity)

TRIG_IN

TRIG_OUT
(delay 5us)

5us

EPO
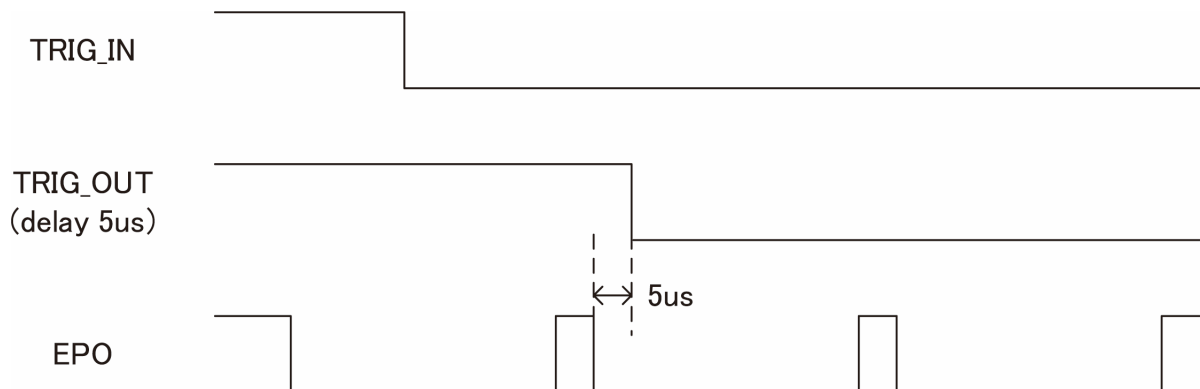
Attention
- •If selecting MULTI1 or trigger reset, the trigger output timing will be forced to "through".
- •The start frame reference differs according to the exposure timing. If the exposure timing is set to GXnative, the exposure start becomes the reference for the start frame, while if set to K4 compatibility, the exposure end becomes the reference for the start frame.

Other

TRIG Status Output (TRIG STS)

The TRIG status signals are signals that indicate that the TRIG has been input when in the ARM mode.
•With negative polarity, it will be the H level before trigger input and the L level after trigger input.
•With positive polarity, it will be the L level before trigger input and the H level after trigger input
•The signals are reset if switched to the VIEW mode.

VD OUT Output (VD OUT)

The VD OUT signals are synchronization signals that can set the desired frequency and output timing.
•The frequency can be a setting that is divided or multiplied by the frame rate.
•The output timing outputs the time delay relative to the synchronization signals in the camera that drives the sensor.
•The minimum unit that can be set is 0.1μs.

Example: When the frequency is double the frame rate, and the output timing is set so 0s (top) and 5μs (bottom) are set as the time delays for the internal synchronization signals (Example when all of the signals have negative polarity)

EPO

Internal
synchronization

VD_OUT
(x2, delay 0μs)

VD_OUT
(x2, delay 5μs)

←→ 5μs
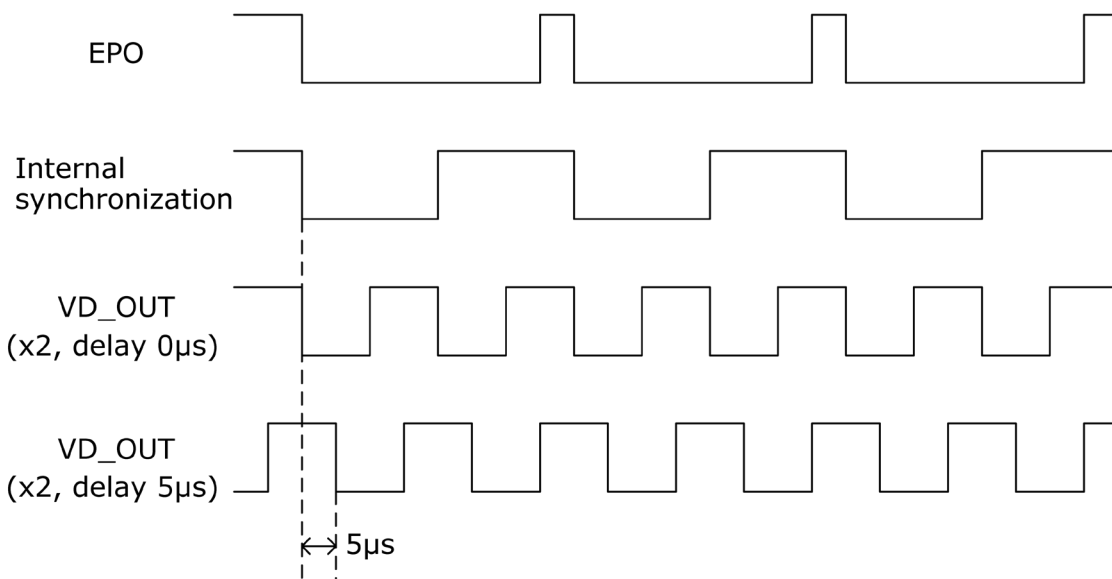
✐Attention •VD OUT cannot be generated when EST synchronization is selected.

Exposure Pulse Signal Output

In order to record synchronized with multiple cameras or devices, the ACS-1 outputs exposure pulse signals EPO.
The EPO is output from the EPO connector on the rear panel or J3 branch cable (sold separately).

■Connect EPO   EPO Connector
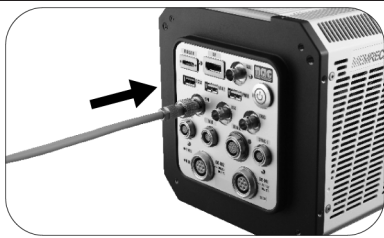
	1	Connect the BNC cable to the EPO connector

1 Connect the BNC cable to the EPO connector
- Connect the BNC cable to the EPO connector.
- Connect the other end of the BNC cable to the synchronizing or observing device.

■Connect EPO   REMOTE Connector
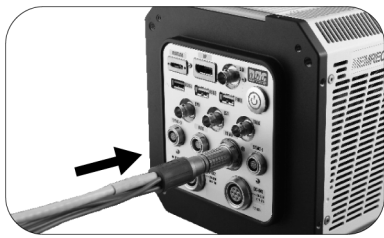
1 Connect the J3 branch cable to the REMOTE connector
- Connect the J3 branch cable (sold separately) to the REMOTE connector.

White

P35<EPO>

2 Connect the BNC cable to the EPO connector of the J3 branch cable
- Connect the BNC cable to the EPO connector of the J3 branch cable.
- Connect the other end of the BNC cable to the synchronizing or observing device.

Other

(00457)H
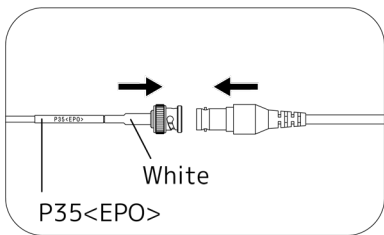
EPO

EPO Signals
•5V CMOS level, insulation, input/output current ±4mA or less
•EPO output circuit specifications (▶▯ 9-53)

During exposure, L level are output but all other times, H level are output. The polarity can be changed in the settings.
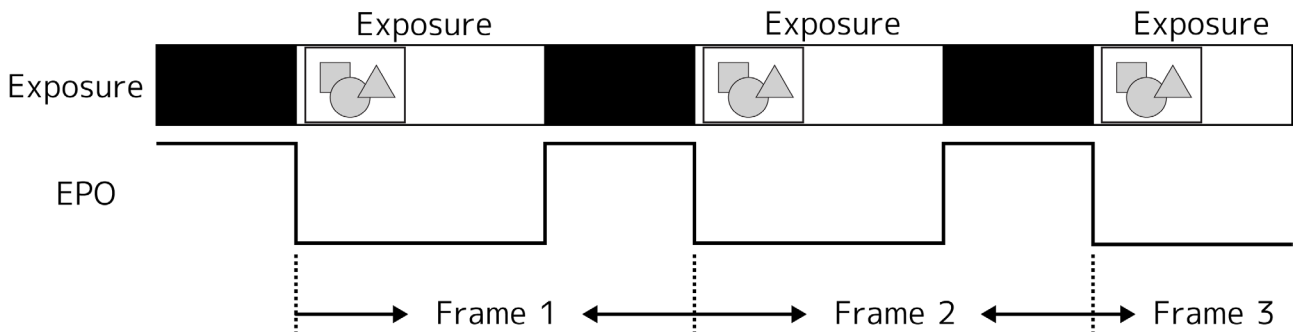
External Input/Output Signal Circuits

■TRIG1

Eqnivalent Circuit Schematic for Inputs
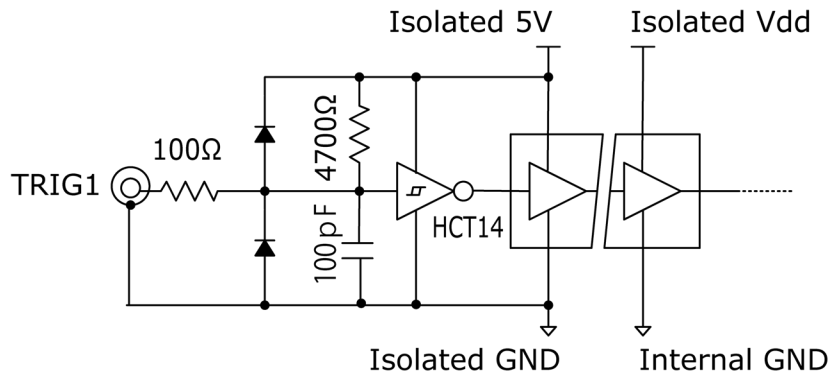
Insulation, TTL level, 5V pullup resistance 4700Ω, L level: 0.5V (minimum applied voltage) to 0.5V, H level: 2V to 5.5V (maximum applied voltage), trigger enabled at H → L, contact input allowed, with polarity reversal function
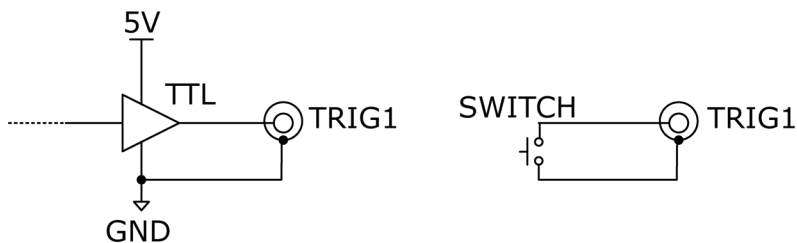
Recommended Interface Circuit

Trigger Filter

Since a digital noise filter circuit is built-in, when there is a lot of outside noise, set the filter value higher so the filter will have a greater effect.
The units for the filter values areμs so the time delay for when clean pulses without chattering are input is shown. The minimum unit that can be set is 0.1μs. The factor setting is 0μs and the range that can be set is 0.0 to 6553.5μs.

If the TRIG1 polarity is positive, a delay of 30ns is added due to the analog filter on the input part, and if the TRIG2 polarity is negative, a delay of 45ns is added.
Also, if driven by a contact or open collector, or if the TRIG1 polarity is positive, a delay of about 30ns is added to about 1.5μs.

Other

(00457)H

■TRIG2

Eqnivalent Circuit Schematic for Inputs
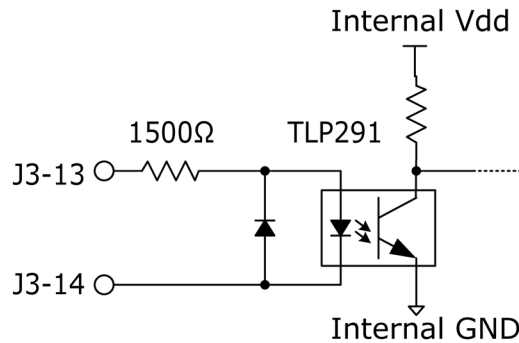
Insulation, current loop with photocoupler, current limit resistor 1500Ω, trigger valid at 5V or more,Maximum applied voltage ± 32V, CRNTOFF (current OFF) level: 0.1 mA or less, CRNTON (current ON) level: 2.4 mA or more,Photocoupler is TLP291 with polarity reversal function
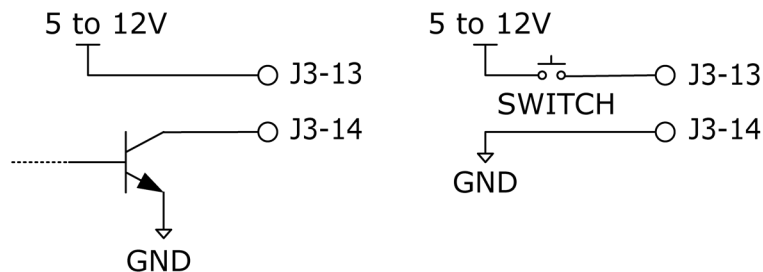
Recommended Interface Circuit

Trigger Filter

Since a digital noise filter circuit is built-in, when there is a lot of outside noise, set the filter value higher so the filter will have a greater effect

The units for the filter values areμs so the time delay for when clean pulses without chattering are input is shown. The minimum unit that can be set is 0.1μs. The factor setting is 0μs and the range that can be set is 0.0 to 6553.5μs.

These filter values can be individually set for two trigger inputs.

The time delay for TRIG2 is about 5μs with a trigger at CRNT ON, and about 25μs with a trigger at CRNT OFF.

■EST2　EVENT

Eqnivalent Circuit Schematic for Inputs
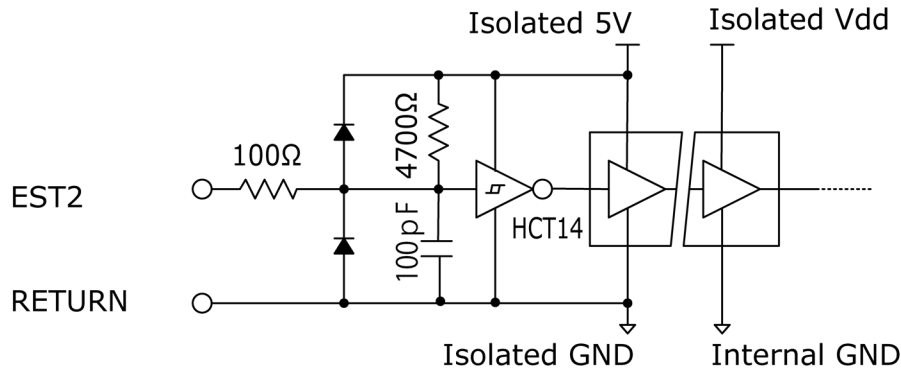
Insulation, TTL level, 5V pullup resistance 4700Ω, L level: -0.5V (minimum applied voltage) to 0.5V, H level: 2V to 5.5V (maximum applied voltage), start exposure at H → L, recording a single image.

Recommended Interface Circuit
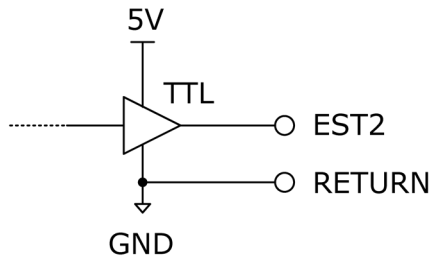
EST Filter

Since a digital noise filter circuit is built-in, when there is a lot of outside noise, set the filter value higher so the filter will have a greater effect.

The units for the filter values areμs so the time delay for when clean pulses without chattering are input is shown. The minimum unit that can be set is 0.1μs. The factor setting is 0μs and the range that can be set is 0.0 to 6553.5μs.

If the EST polarity is positive, a delay of 30ns is added due to the analog filter on the input part, and if the EST polarity is negative, a delay of 45ns is added.

Also, if driven by a contact or open collector, or if the EST polarity is positive, a delay of about 30ns is added to about 1.5μs.

0.75μs

EST signal

0.5V

0V

Sensor
exposure

Exposure

T
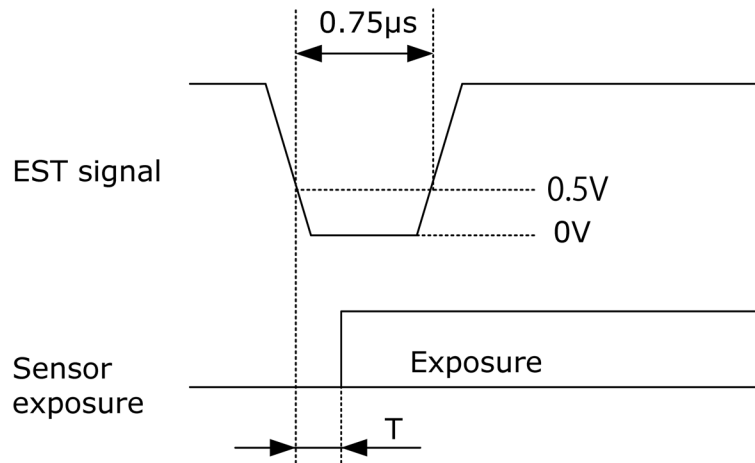
Timing Diagram when the Noise Filter Setting is 0μs

Exposure delay (T)= Fixed delay + Delay from the filter

EST 770ns Refer to the previous page

Attention •Set the exposure timing to GXnative when using the EST function.

■EPO

Eqnivalent Circuit Schematic for Outputs
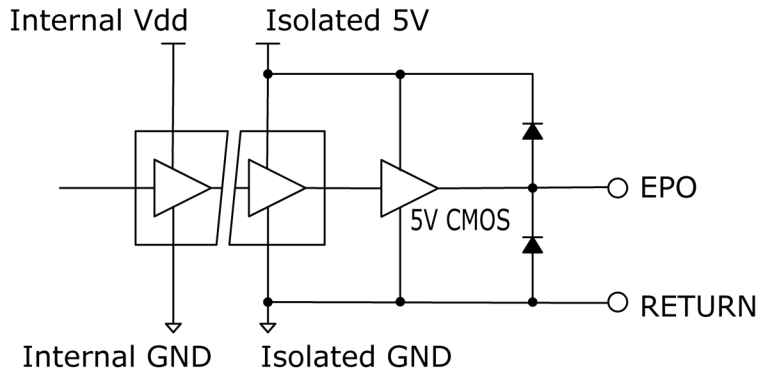
Internal Vdd   Isolated 5V

5V CMOS

○ EPO

○ RETURN

Internal GND   Isolated GND

Insulation, 5V CMOS level, L level: 0.4VDC or less, H level:4.0VDC or more, input/output current ±4mA or less, L during exposure. With polarity reversal function

Recommended Interface Circuit

5V

4700Ω

TTL

EPO ○

RETURN ○

GND

Timing ACS-1

Exposure

Sensor exposure

EPO signal

2.5V

0V

About 0.1μs   About 0.1μs
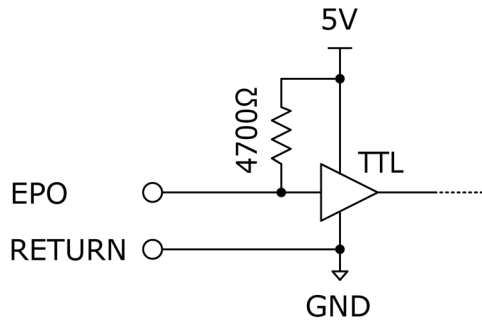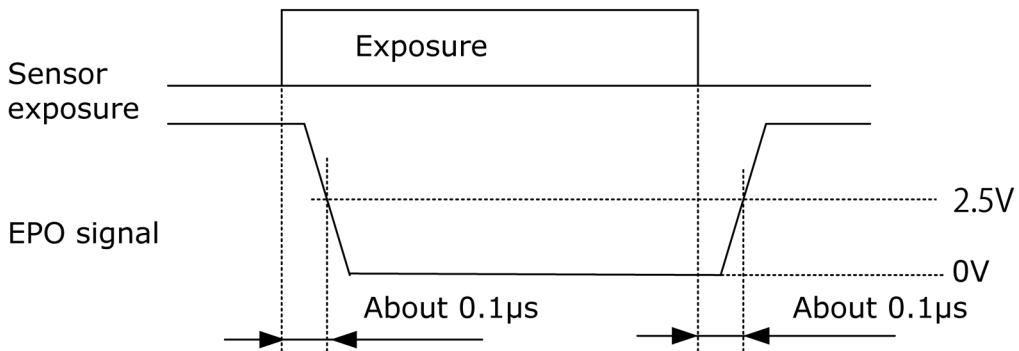
Exposure timing · jitter (time change from the adjacent exposure timing) within ±20ns

Other

Easy Synchronized Recording

Easy synchronized recording can be performed by using multiple ACS · HX · GX series cameras and exposure pulse output (EPO) signals.
Additionally, synchronized recording is possible with other camera that have a synchronization function.

 "Easy" refers to the possibility of not being able to guarantee time accuracy due to signal delays or time changes and because there are limitations to all cameras having the same frame rate.

With easy synchronized recording, the master/slave cameras are determined to construct a system. There is a single master camera out of the cameras used, and the remaining cameras are slave cameras. The exposure pulse output (EPO) signals from the master camera connect to the exposure start signal (EST) input for all of the slave cameras.

If combined with other cameras, refer to those manuals and match the signal polarities.

Attention •Since the exposure pulse output (EPO) signals are equivalent to the exposure time (shutter time), if set to the shortest exposure time (or long enough for OPEN), the pulse width will also be shorter. Signal transmission also requires you to pay attention to converting to a suitable interface and to the cable properties. There may be times when erroneous pulses are detected with an improper method of use, or when pulses may be deleted and not be sent.

■ GENERAL IN

Eqnivalent Circuit Schematic for Inputs
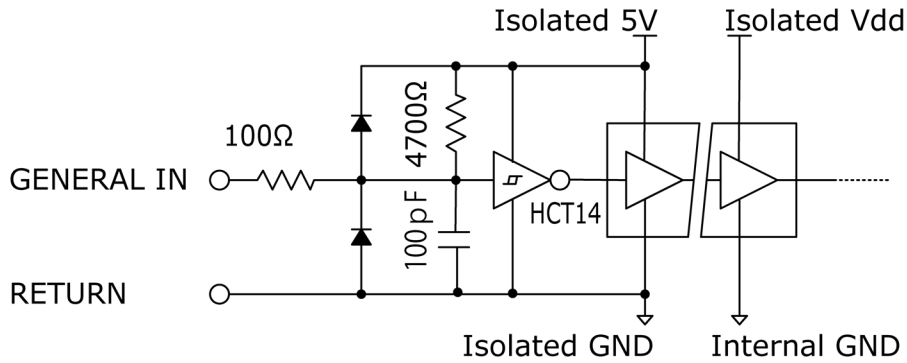
Insulation, TTL level, 5V pullup resistance 4700Ω, L level: -0.5V (minimum applied voltage) to 0.5V, H level: 2V to5.5V (maximum applied voltage), contact input allowed, with polarity reversal function

Recommended Interface Circuit
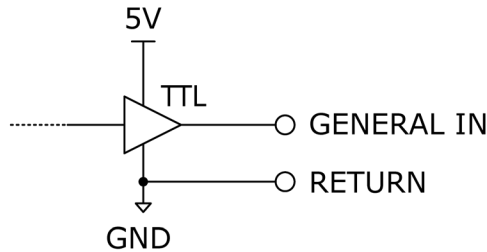
Circuit to input the ARM command with logic signals
The H → L logic level can be set. To simultaneously put multiple cameras in the ARM mode, use the ARM command to connect all of the cameras for a single signal. Take note that the ARM command signals are at the H level when not connected (open state).

Recommended Interface Circuit 2
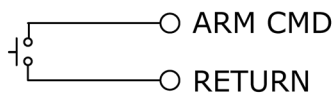
Circuit to input commands with contact signals.
The polarity is set to enable commands with the L level.
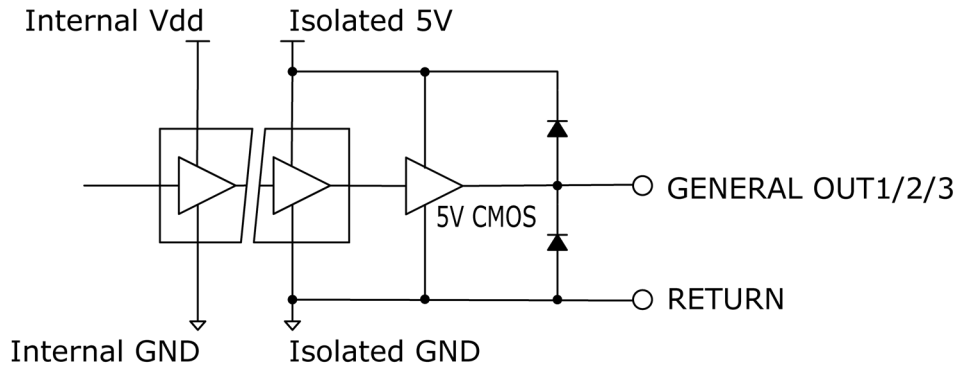
Other

9-55

■GENERAL OUT

Eqnivalent Circuit Schematic for Inputs

Insulation, 5V CMOS level. L level: 0.4VDC or less, H level: 4.0VDC or more. Input/output current ±4mA or less

Recommended Interface Circuit
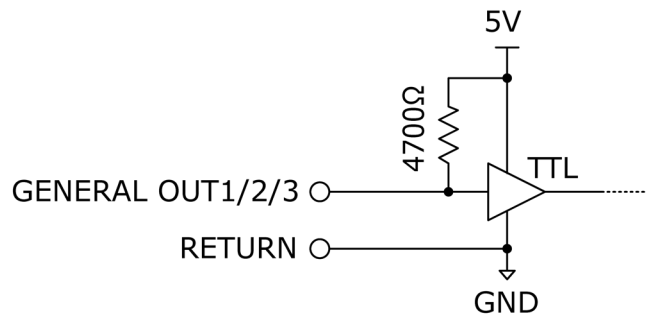
Signals output from GENERAL OUT can be selected from the following.
  •ARM STS OUT
  •FAULT STS OUT
  •TRIG OUT
  •VD OUT

■Power Control Input (PWRCNT)

Eqnivalent Circuit Schematic for Inputs
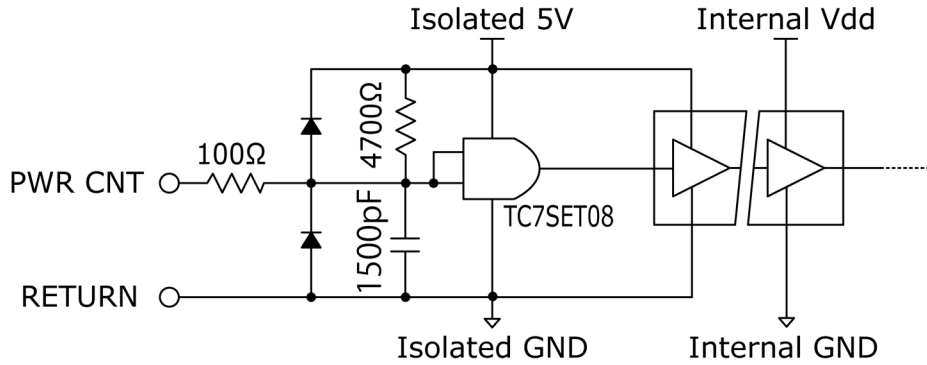
Insulation, TTL level, 5V pullup resistance 4700Ω, L level: -0.5V (minimum applied voltage) to 0.8V, H level: 2V to 5.5V (maximum applied voltage), power ON at L → H, power OFF at L, contact input allowed, without polarity reversal function.

Recommended Interface Circuit
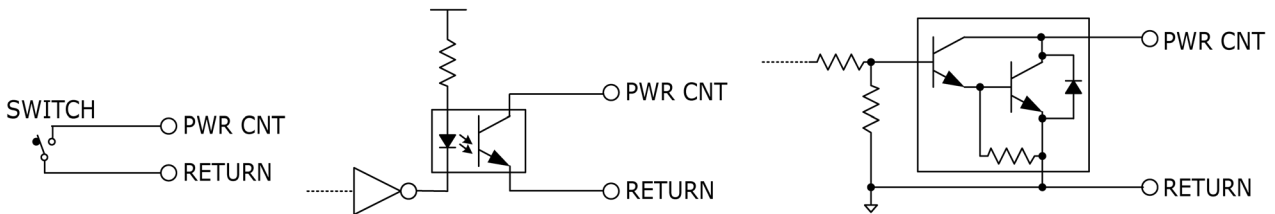
Power ON at open or H level, power OFF at a short between two pins or at L level. These signals are subject to power batch control on the multi-camera system using the GX-HUB.

Other

(00457)H

■ IRIG-B

Standards	IRIG Standard 200-98, IEEE1344 Compatible with 1kHz carrier modulated IRIG-B (B120, B122, B123 format). Carrier signals used, BCD code, some CF (IEEE1344 TMOF). Not compatible with non-modulated IRIG-B (B000, B003 format).

Modulate IRIG-B waveform and exposure timing

| P (reference) bit | 0 bit | 1 bit |
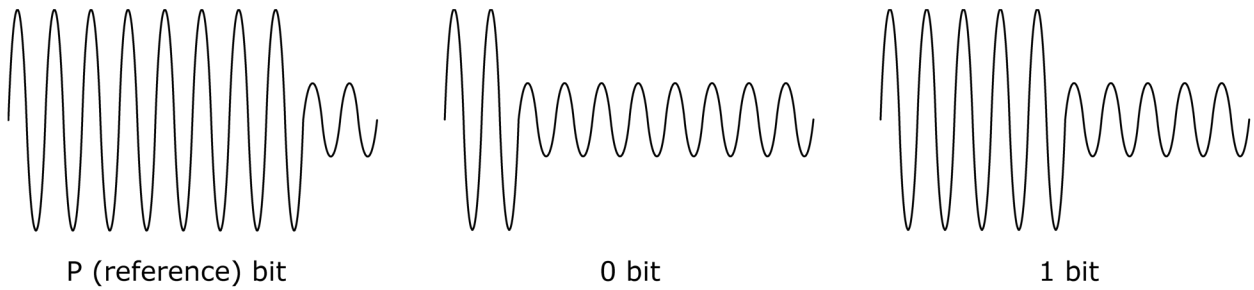
Modulation is at P bit,0 bit and 1 bit. The reference timing is the top part. 10 carriers per bit, 100 bits per second. P bits per 0.1 second. 1 carrier is 1 ms.
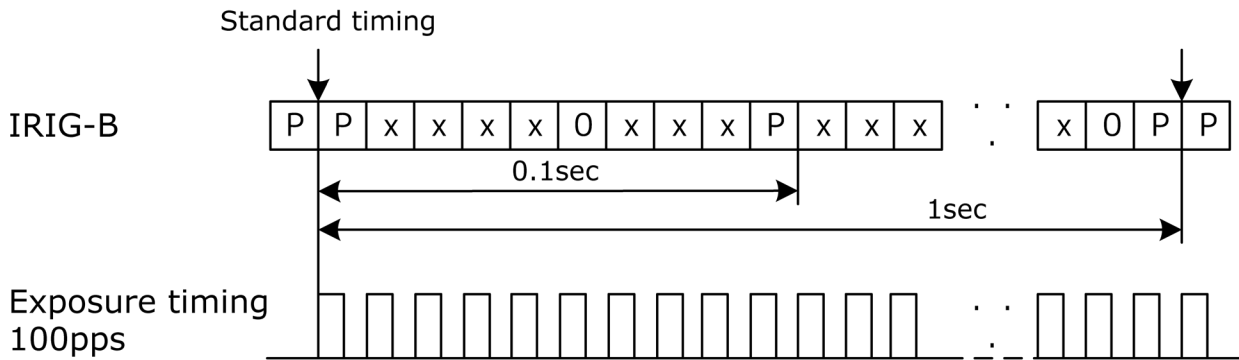
The example above shows the IRIG-B and exposure timing for 100 frames/second. In the figure, "x" indicates "1" or "0" bits.
The IRIG-B and the exposure starts match for the reference timing at any frame rate.

Troubleshooting

■ Power

Problem	Solution	»🕮
There is no power The power is cut off	•Check the connection to the power cable. •Turn the power switch on the AC adapter ON. •If there is power from something other than the AC adapter, check the voltage and rated output. •If the status LED for PWR is blinking red and green, a thermal shutdown has occurred. Turn the power to the AC adapter OFF.	2-9 3-5

■ Startup and Preparations

Problem	Solution	»🕮
I want to see if the camera has started up properly.	Check the following. •The status LED for the CAM MODE is lit in blue. •An image is properly displayed on the monitor and it is in the STOP mode.	3-5 3-22
The image is not shown on the monitor connected to the DisplayPort	•Check the cable connections. •Turn on the power to the monitor again.	2-12 2-9
The image is not shown on the monitor connected to the 3G-SDI	•Check the cable connections. •Turn on the power to the monitor again. •Check to see if it the monitor is compatible with 3G-SDI Level A.	2-11
Cannot connect from MLink	•Check the network settings. •Check that the status LED for the ETHERNET is on or flashing. •Check that the PC network card (or the switching hub or router) LED is blinking. •Check the ping command response from the PC.	3-5
I want to initialize the settings	•Revert to the factory settings.	8-3

Other

(00457)H

■ Recording 1/2

Problem	Solution	⏩📖
It won't switch to ARM mode	•If auto segment switching (recording method) is set to AUTO or the auto view function is used, the recorded segment is protected and does not switch to ARM mode. 　•Reset the segments and delete the recorded video. 　•Set the auto segment switch to something other than AUTO. 　•Turn the auto view function OFF.	7-7
The video doesn't refresh	•Check if set to EST (external signal synchronization), and the EST signals are not input → check the EST connection and input signals. •Selection of the synchronization signals is incorrection → select the synchronization signals to be used. •If Multi1, Multi3 or Burst recording is selected, the video will not refresh depending on the frame size and pixel bit length.	7-27 7-37
The EST are not synchronized	•The polarity of the EST signals is wrong → Set the polarity for EST. •Selection of the synchronization signals is wrong → Select the synchronization signals to be used.	7-27
Cannot input the trigger with external input	•Selection of the external trigger is wrong → Select the external trigger to be used. •Check if the external trigger signals are enabled. •Set the polarity of the external trigger signals.	7-9
It is dark even when the aperture focuses	•After turning the mount aperture ring to CLOSE, adjust the mount aperture ring. •The subject to be recorded is too bright → Adjust the brightness or lens filter to match the frame rate or shutter speed.	2-5
When I switch to the ARM mode, it immediately goes to the REC mode	•Check that the external trigger input is enabled → set the polarity of the external trigger signals, check the trigger signals. •If the recording method is LINEAR → switch to NORMAL.	7-12 9-40

■Recording　2/2

Problem	Solution	▸▥
It gets hot when used for a long time	•If warm to the touch but there is no warning, and the cooling fan is operating → it is within the normal operating range •A warning for abnormal temperature appears. → Turn off the power, contact the retail outlet where purchased.	

■Images

Problem	Solution	▸▥
The video is totally black	•Remove the lens cap. •Set the frame rate and shutter speed, arrange the proper lighting.	2-4
There is a lot of noise	•Gain is high → Set the digital gain. •Get the black balance.	4-44 4-42
There are vertical lines on the video	•The EST synchronization recording conditions are not satisfied → Set to match the EST.	7-27
The image is squished (improper aspect ratio)	•Set the monitor display resolution to the optimal resolution. •If the settings can be made for scaling on the monitor, refer to the user's guide for the monitor used.	10-48

Other

9-61

■ Saving

Problem	Solution	➤📖
The video is not saved on the USB flash drive	•If used for the first time, initialize the USB flash drive. •There is not enough free space on the USB flash drive, use a different USB flash drive or delete videos and data that are not needed.	
Saving doesn't proceed	•If large amounts of data are saved on a USB flash drive, it takes time. Rule of thumb (1-2 hours to save 32GB as MCFF, several hours to save as MJPEG) •When in a hurry to save, save by downloading with MLink	
USB3.0 downloads are not possible	•Install a driver for USB3.0 downloads Refer to the MLink user's guide for details •Connect the cable to the PC USB3.0 connector	2-13

■List of Warnings (1/3)

Warning	Details	Response	➡📖
Auto pilot init failed!	Cannot load the auto pilot sequence file.	Refer to the auto pilot section of the MLink user's guide.	
Auto pilot sequence error! LINE=******	The description for the auto pilot sequence file is wrong.	Refer to the auto pilot section of the MLink user's guide.	
Black Balance does not suit. Recording setting differs from a re-corded image.	The black balance is for a recording setting that does not match the recorded image.	Get the black balance after making the same settings (frame rate, shutter speed, frame size) as when the recorded image was recorded (However, the black balance correction will not be the same as when recorded)	4-42
	Recorded at a black balance that does not match the recording settings.	After recording is done, get the black bal-ance right away, without changing the set-tings.	7-27 4-42
Black Balance Re-cording timeout!	The EST signals from when using EST and from when getting the black balance were not input.	Input the EST signals.	7-27
DCIN. High Voltage! (Over 32V)	The input voltage is too high.	•When using the AC POWER SYSTEM → turn off the power to the camera and AC adapter and contact us. •When using another power source → check the voltage, current and waveform of the power supply connected.	10-55
DCIN. Low Voltage! (Under 20V)	The input voltage is too low and unstable.	•When using the AC POWER SYSTEM → turn off the power to the camera and AC adapter and contact us. •When using another power source → check the voltage, current and waveform of the power supply connected.	10-55

Other

■List of Warnings (2/3)

Warning	Details	Response	➠📖
DRP temperature is outside the range	The camera temperature is abnormal.	•Ambient temperature is high → Use within the temperature range for warrantied operation. Do not place the unit in direct sunlight or where hot. •The intake port and exhaust port are plugged → Check the location of the intake port and exhaust port and make sure they aren't plugged.	10-71
Memory protected. AUTOVIEW=AUTO	The memory is protected by the auto view function.	•Delete the recorded video. •Turn the auto view function OFF.	7-7
Memory protected. REC MODE=****/	The memory is protected by the auto segment switch "AUTO" setting.	•Delete the recorded video. •Change the settings for the recording method.	7-7 7-19
Power Drop Detected. *******	The power supply input is unstable (outage).	When using the AC POWER SYSTEM → Turn off the power to the camera and AC adapter and contact us. When using another power source → Check the voltage, current and waveform of the power supply connected.	
RTC battery is low power!	The RTC battery is dead.	Contact us to replace the RTC battery.	
	It is set to an old date.	•Set to a date before 2003 → Set to the current date. •When connected with MLink to a PC that is set to a date before 2003→ set the date on the PC. (Refer to the MLink user's guide for details)	

■ List of Warnings (3/3)

Warning	Details	Response	➡📖
Saving failure!	Not properly saved on the USB flash drive.	The USB unit is not operating correctly (compatibility issue) → Use a different flash drive.	
Sensor temperature is outside the range.	Abnormal sensor temperature	•High ambient temperature → Use within the temperature range for warrantied operation. Do not place the unit in direct sunlight or where hot. •The intake port and exhaust port are plugged → Check the location of the intake port and exhaust port and make sure they aren't plugged.	10-71
Trigger signal is asserted. Trigger signal is asserted. [ARM]	The external trigger is input during startup and when switching the VIEW/ARM mode.	•The polarity of the external input/output is not set properly. •The external input/output connection is wrong. (Example: EST2 signal is connected to TRIG1) → Correct to be connected properly •The external input/output signals are wrong, or there is a lot of noise → Input the correct signals.	7-12 7-27
Update Black Balance Data!	You must get the black balance.	Get the black balance.	4-42

✐ Attention •If a warning not shown in the list is displayed, check the message details and contact us.

■ Contact Information

When contacting us regarding problems, maintenance and repairs, provide symptoms as well as the following information so we can better help you.

•CID (Camera individual identification number):   CID check method
•Memory: Method of checking the memory
•Serial Number: The 4 digit number written on the label affixed to the bottom of the unit

Other

10

Specification

Spec

10-1

(00457)H

Image Sensor

(00457)H

■ Imaging Element

Format	About 2.15 inch CMOS sensor (monochome,color)
Pixel size	22µm x 22µm
Valid Pixels	1280 × 896 pixels (1,140,000 pixels)
Maximum Area	28.16 × 19.712 mm
Optical Axis Center Accuracy	±0.5 mm

(00457)H

■ Frame Rates and Valid Pixels ACS-1E Normal mode(1/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
35,000 or less	1280	896	28.16	19.712	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split
40,000	1280	800	28.16	17.6	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split
45,000	1280	720	28.16	15.84	Split
	1008	720	22.176	15.84	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split
50,000	1280	640	28.16	14.08	Split
	1280	576	28.16	12.672	Split
	1008	640	22.176	14.08	Split
	672	576	14.784	12.672	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split

Spec

10-3

■ Frame Rates and Valid Pixels ACS-1E Normal mode (2/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
60,000	1280	528	28.16	11.616	Split
	1008	528	22.176	11.616	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split
65,000	1280	480	28.16	10.56	Split
	1280	448	28.16	9.856	Split
	1008	480	22.176	10.56	Split
	672	480	14.784	10.56	Split
	672	448	14.784	9.856	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split
75,000	1280	400	28.16	8.8	Split
	1008	400	22.176	8.8	Split
	672	400	14.784	8.8	Split
	336	256	7.392	5.632	Split
100,000	1280	288	28.16	6.336	Split
	1008	288	22.176	6.336	Split
	672	288	14.784	6.336	Split
	336	256	7.392	5.632	Split
120,000	1280	224	28.16	4.928	Split
	1280	192	28.16	4.224	Split
	1008	224	22.176	4.928	Split
	672	224	14.784	4.928	Split
	336	224	7.392	4.928	Split
	336	192	7.392	4.224	Split

■ Frame Rates and Valid Pixels ACS-1E Normal mode (3/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
200,000	1280	112	28.16	2.464	Split
	1280	96	28.16	2.112	Split
	1280	64	28.16	1.408	Split
	1008	112	22.176	2.464	Split
	672	112	14.784	2.464	Split
	336	112	7.392	2.464	Split
220,000	1280	96	28.16	2.112	Split
	336	96	7.392	2.112	Split

Custom Frame Size : In units of 16 horizontal pixels and 16 vertical pixels

Spec

(00457)H

■ Frame Rates and Valid Pixels ACS-1E Boost mode

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
40,000	1280	896	28.16	19.712	Split
45,000	1280	896	28.16	19.712	Split
50,000	1280	896	28.16	19.712	Split
60,000	1280	896	28.16	19.712	Split
65,000	1280	896	28.16	19.712	Split
75,000	1280	800	28.16	17.6	Split
100,000	1280	576	28.16	12.672	Split
	672	576	14.784	12.672	Split
120,000	1280	448	28.16	9.856	Split
	672	448	14.784	9.856	Split
200,000	1280	224	28.16	4.928	Split
	336	224	7.392	4.928	Split
220,000	1280	192	28.16	4.224	Split
	336	192	7.392	4.224	Split

⊘ATTENTION
- Boost mode supports only Mono, not color.

☆CHECK
- Boost mode is preset only.
- Custom frame rate and custom frame size functions cannot be used.

■ Frame Rates and Valid Pixels ACS-1 Normal mode (1/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
35,000 or less	1280	896	28.16	19.712	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	4:3 (VGA)
	336	256	7.392	5.632	Split
40,000	1280	800	28.16	17.6	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	4:3 (VGA)
	336	256	7.392	5.632	Split
45,000	1280	720	28.16	15.84	Split
	1008	720	22.176	15.84	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split
50,000	1280	640	28.16	14.08	Split
	1280	576	28.16	12.672	Split
	1008	640	22.176	14.08	Split
	672	576	14.784	12.672	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split

Spec

■Frame Rates and Valid Pixels ACS-1 Normal mode (2/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
60,000	1280	528	28.16	11.616	Split
	1008	528	22.176	11.616	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	4:3 (VGA)
	336	256	7.392	5.632	Split
65,000	1280	480	28.16	10.56	Split
	1280	448	28.16	9.856	Split
	1008	480	22.176	10.56	Split
	672	480	14.784	10.56	Split
	672	448	14.784	9.856	Split
	640	480	14.08	10.56	4:3 (VGA)
	336	256	7.392	5.632	Split
75,000	1280	400	28.16	8.8	Split
	1008	400	22.176	8.8	Split
	672	400	14.784	8.8	Split
	336	256	7.392	5.632	Split
100,000	1280	288	28.16	6.336	Split
	1008	288	22.176	6.336	Split
	672	288	14.784	6.336	Split
	336	256	7.392	5.632	Split
120,000	1280	224	28.16	4.928	Split
	1008	224	22.176	4.928	Split
	672	224	14.784	4.928	Split
	336	224	7.392	4.928	Split

■ Frame Rates and Valid Pixels ACS-1 Normal mode (3/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
200,000	1280	112	28.16	2.464	Split
	1280	96	28.16	2.112	Split
	1280	64	28.16	1.408	Split
	1008	112	22.176	2.464	Split
	672	112	14.784	2.464	Split
	336	112	7.392	2.464	Split
	336	96	7.392	2.112	Split
	336	64	7.392	1.408	Split
300,000	1280	48	28.16	1.056	Split
	336	48	7.392	1.056	Split
400,000	1280	32	28.16	0.704	Split
	336	32	7.392	0.704	Split
500,000	1280	16	28.16	0.352	Split
	336	16	7.392	0.352	Split
540,000	1280	16	28.16	0.352	Split
	336	16	7.392	0.352	Split

Custom Frame Size : In units of 16 horizontal pixels and 16 vertical pixels

Spec

10-9

(00457)H

■ Frame Rates and Valid Pixels ACS-1　Boost mode

Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
40,000	1280	896	28.16	19.712	Split
45,000	1280	896	28.16	19.712	Split
50,000	1280	896	28.16	19.712	Split
60,000	1280	896	28.16	19.712	Split
65,000	1280	896	28.16	19.712	Split
75,000	1280	800	28.16	17.6	Split
100,000	1280	576	28.16	12.672	Split
	672	576	14.784	12.672	Split
120,000	1280	448	28.16	9.856	Split
	672	448	14.784	9.856	Split
200,000	1280	224	28.16	4.928	Split
	336	224	7.392	4.928	Split
300,000	1280	96	28.16	2.112	Split
	336	96	7.392	2.112	Split
400,000	1280	64	28.16	1.408	Split
	336	64	7.392	1.408	Split
500,000	1280	32	28.16	0.704	Split
	336	32	7.392	0.704	Split
540,000	1280	32	28.16	0.704	Split
	336	32	7.392	0.704	Split

⊘ATTENTION　• Boost mode supports only Mono, not color.

↘CHECK　• Boost mode is preset only.

　　• Custom frame rate and custom frame size functions cannot be used.

■ Frame Rates and Valid Pixels ACS-1 M60E Normal mode (1/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
54,000 or less	1280	896	28.16	19.712	Split
	1280	768	28.16	16.896	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
60,000	1280	800	28.16	17.6	Split
	1280	768	28.16	16.896	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
65,000	1280	736	28.16	16.192	Split
	1280	720	28.16	15.84	Split
	1280	704	28.16	15.488	Split
	1280	640	28.16	14.08	Split
	1008	736	22.176	16.192	Split
	672	640	14.784	14.08	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split

Spec

■ Frame Rates and Valid Pixels ACS-1 M60E Normal mode (2/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
75,000	1280	624	28.16	13.728	Split
	1280	544	28.16	11.968	Split
	1008	624	22.176	13.728	Split
	672	544	14.784	11.968	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
100,000	1280	448	28.16	9.856	Split
	1280	384	28.16	8.448	Split
	1008	448	22.176	9.856	Split
	672	384	14.784	8.448	Split
	672	448	14.784	9.856	Split
	336	256	7.392	5.632	Split
120,000	1280	368	28.16	8.096	Split
	1008	368	22.176	8.096	Split
	672	368	14.784	8.096	Split
	336	256	7.392	5.632	Split
150,000	1280	288	28.16	6.336	Split
	1008	288	22.176	6.336	Split
	672	288	14.784	6.336	Split
	336	256	7.392	5.632	Split

■ Frame Rates and Valid Pixels ACS-1 M60E Normal mode (3/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
200,000	1280	192	28.16	4.224	Split
	1008	192	22.176	4.224	Split
	672	192	14.784	4.224	Split
	336	192	7.392	4.224	Split
220,000	1280	176	28.16	3.872	Split
	1008	176	22.176	3.872	Split
	672	176	14.784	3.872	Split
	336	176	7.392	3.872	Split

Custom Frame Size : In units of 16 horizontal pixels and 16 vertical pixels

✓CHECK☆ • 65,000 or less includes 60,000, 54,000, 50,000, 30,000, 20,000, 10,000, 5,000, 2,000, 1,000, 500, 100, 60 and 50 fps.

Spec

■Frame Rates and Valid Pixels ACS-1 M60E Boost mode

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
60,000	1280	896	28.16	19.712	Split
65,000	1280	896	28.16	19.712	Split
75,000	1280	896	28.16	19.712	Split
100,000	1280	896	28.16	19.712	Split
120,000	1280	704	28.16	15.488	Split
150,000	1280	544	28.16	11.968	Split
	672	544	14.784	11.968	Split
200,000	1280	384	28.16	8.448	Split
	672	384	14.784	8.448	Split
220,000	1280	352	28.16	7.744	Split
	672	352	14.784	7.744	Split

⚠Attention • Boost mode supports only Mono, not color.

☑CHECK • Boost mode is preset only.

• Custom frame rate and custom frame size functions cannot be used.

■Frame Rates and Valid Pixels ACS-1 M60E Boost 4 mode

Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
120,000	1280	896	28.16	19.712	Split
150,000	1280	896	28.16	19.712	Split
200,000	1280	768	28.16	16.896	Split
220,000	1280	640	28.16	14.08	Split
220,000	672	640	14.784	14.08	Split

ATTENTION
- Boost 4 mode supports only Mono, not color.
- Please contact us or our distributors for models compatible with Boost 4 mode.

CHECK
- Boost 4 mode is preset only.
- Custom frame rate and custom frame size functions cannot be used.

Spec

10-15

■ Frame Rates and Valid Pixels ACS-1 M60 Normal mode (1/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
54,000 or less	1280	896	28.16	19.712	Split
	1280	768	28.16	16.896	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
60,000	1280	800	28.16	17.6	Split
	1280	768	28.16	16.896	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
65,000	1280	736	28.16	16.192	Split
	1280	720	28.16	15.84	Split
	1280	704	28.16	15.488	Split
	1008	736	22.176	16.192	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split

■Frame Rates and Valid Pixels ACS-1 M60 Normal mode (2/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
75,000	1280	624	28.16	13.728	Split
	1280	544	28.16	11.968	Split
	1008	624	22.176	13.728	Split
	672	544	14.784	11.968	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
100,000	1280	448	28.16	9.856	Split
	1280	384	28.16	8.448	Split
	1008	448	22.176	9.856	Split
	672	448	14.784	8.448	Split
	672	384	14.784	9.856	Split
	336	256	7.392	5.632	Split
120,000	1280	368	28.16	8.096	Split
	1008	368	22.176	8.096	Split
	672	368	14.784	8.096	Split
	336	256	7.392	5.632	Split
150,000	1280	288	28.16	6.336	Split
	1008	288	22.176	6.336	Split
	672	288	14.784	6.336	Split
	336	256	7.392	5.632	Split

Spec

10-17

■ Frame Rates and Valid Pixels ACS-1 M60 Normal mode (3/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
200,000	1280	192	28.16	4.224	Split
	1280	128	28.16	2.816	Split
	1008	192	22.176	4.224	Split
	672	192	14.784	4.224	Split
	336	192	7.392	4.224	Split
	336	128	7.392	2.816	Split
300,000	1280	96	28.16	2.112	Split
	1280	64	28.16	1.408	Split
	1008	96	22.176	2.112	Split
	672	96	14.784	2.112	Split
	336	96	7.392	2.112	Split
	336	64	7.392	1.408	Split
400,000	1280	48	28.16	1.056	Split
	336	48	7.392	1.056	Split
500,000	1280	32	28.16	0.704	Split
	336	32	7.392	0.704	Split
700,000	1280	16	28.16	0.352	Split
	336	16	7.392	0.352	Split
1,000,000	1280	16	28.16	0.352	Split
	336	16	7.392	0.352	Split

CHECK • 54,000 or less includes 54,000, 50,000, 30,000, 20,000, 10,000, 5,000, 2,000, 1,000, 500, 100, 60 and 50 fps.

■ Frame Rates and Valid Pixels ACS-1M60 Boost mode

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
60,000	1280	896	28.16	19.712	Split
65,000	1280	896	28.16	19.712	Split
75,000	1280	896	28.16	19.712	Split
100,000	1280	896	28.16	19.712	Split
120,000	1280	704	28.16	15.488	Split
150,000	1280	544	28.16	11.968	Split
	672	544	14.784	11.968	Split
200,000	1280	384	28.16	8.448	Split
	672	384	14.784	8.448	Split
300,000	1280	192	28.16	4.224	Split
	336	192	7.392	4.224	Split
400,000	1280	96	28.16	2.112	Split
	336	96	7.392	2.112	Split
500,000	1280	64	28.16	1.408	Split
	336	64	7.392	1.408	Split
700,000	1280	32	28.16	0.704	Split
	336	32	7.392	0.704	Split
1,000,000	1280	32	28.16	0.704	Split
	336	32	7.392	0.704	Split

Attention • Boost mode supports only Mono, not color.

CHECK • Boost mode is preset only.
• Custom frame rate and custom frame size functions cannot be used.

■Frame Rates and Valid Pixels ACS-1M60 Boost 4 mode

Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
120,000	1280	896	28.16	19.712	Split
150,000	1280	896	28.16	19.712	Split
200,000	1280	768	28.16	16.896	Split
300,000	1280	384	28.16	8.448	Split
	672	384	14.784	8.448	Split
400,000	1280	192	28.16	4.224	Split
	336	192	7.392	4.224	Split
500,000	1280	128	28.16	2.816	Split
	336	128	7.392	2.816	Split
700,000	1280	64	28.16	1.408	Split
	336	64	7.392	1.408	Split

Attention
- Boost 4 mode supports only Mono, not color.
- Please contact us or our distributors for models compatible with Boost 4 mode.

CHECK
- Boost 4 mode is preset only.
- Custom frame rate and custom frame size functions cannot be used.

10-20

■ Frame Rates and Valid Pixels ACS-1 M40E Normal mode (1/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
35,000 or less	1280	896	28.16	19.712	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
40,000	1280	800	28.16	17.6	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
45,000	1280	720	28.16	15.84	16:9
	1280	704	28.16	15.488	Split
	1008	720	22.176	15.84	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
50,000	1280	640	28.16	14.08	Split
	1280	576	28.16	12.672	Split
	1008	640	22.176	14.08	Split
	672	576	14.784	12.672	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split

Spec

■ Frame Rates and Valid Pixels ACS-1 M40E Normal mode (2/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
60,000	1280	528	28.16	11.616	Split
	1008	528	22.176	11.616	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
65,000	1280	480	28.16	10.56	Split
	1280	448	28.16	9.856	Split
	1008	480	22.176	10.56	Split
	672	480	14.784	10.56	Split
	672	448	14.784	9.856	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split
75,000	1280	400	28.16	8.8	Split
	1280	384	28.16	8.448	Split
	1280	352	28.16	7.744	Split
	1008	400	22.176	8.8	Split
	672	400	14.784	8.8	Split
	672	384	14.784	8.448	Split
	672	352	14.784	7.744	Split
	336	256	7.392	5.632	VGA (4:3)
100,000	1280	288	28.16	6.336	Split
	1008	288	22.176	6.336	Split
	672	288	14.784	6.336	Split
	336	256	7.392	5.632	Split

■ Frame Rates and Valid Pixels ACS-1 M40E Normal mode (3/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
120,000	1280	224	28.16	4.928	Split
	1280	192	28.16	4.224	Split
	1008	224	22.176	4.928	Split
	672	224	14.784	4.928	Split
	336	224	7.392	4.928	Split
	336	192	7.392	4.224	Split
150,000	1280	176	28.16	3.872	Split
	1008	176	22.176	3.872	Split
	672	176	14.784	3.872	Split
	336	176	7.392	3.872	Split
200,000	1280	112	28.16	2.464	Split
	1280	96	28.16	2.112	Split
	1280	64	28.16	1.408	Split
	1008	112	22.176	2.464	Split
	672	112	14.784	2.464	Split
	336	112	7.392	2.464	Split
	336	96	7.392	2.112	Split
	336	64	7.392	1.408	Split
220,000	1280	96	28.16	2.112	Split
	336	96	7.392	2.112	Split

Custom Frame Size : In units of 16 horizontal pixels and 16 vertical pixels

CHECK • 35,000 or less includes 30,000, 20,000, 10,000, 5,000, 2,000, 1,000, 500, 100, 60 and 50 fps.

Spec

10-23

■ Frame Rates and Valid Pixels ACS-1 M40E Boost mode

Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
40,000	1280	896	28.16	19.712	Split
45,000	1280	896	28.16	19.712	Split
50,000	1280	896	28.16	19.712	Split
60,000	1280	896	28.16	19.712	Split
65,000	1280	896	28.16	19.712	Split
75,000	1280	800	28.16	17.6	Split
100,000	1280	576	28.16	12.672	Split
	672	576	14.784	12.672	Split
120,000	1280	448	28.16	9.856	Split
	672	448	14.784	9.856	Split
150,000	1280	352	28.16	7.744	Split
	672	352	14.784	7.744	Split
200,000	1280	224	28.16	4.928	Split
	336	224	7.392	4.928	Split
220,000	1280	192	28.16	4.224	Split
	336	192	7.392	4.224	Split

Attention
- Boost mode supports only Mono, not color.

CHECK
- Boost mode is preset only.
- Custom frame rate and custom frame size functions cannot be used.

■ Frame Rates and Valid Pixels ACS-1 M40E Boost 4 mode

Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
75,000	1280	896	28.16	19.712	Split
100,000	1280	896	28.16	19.712	Split
120,000	1280	896	28.16	19.712	Split
150,000	1280	704	28.16	15.488	Split
200,000	1280	448	28.16	9.856	Split
200,000	672	448	14.784	9.856	Split
220,000	1280	384	28.16	8.448	Split
220,000	672	384	14.784	8.448	Split

Attention
- Boost 4 mode supports only Mono, not color.
- Please contact us or our distributors for models compatible with Boost 4 mode.

CHECK
- Boost 4 mode is preset only.
- Custom frame rate and custom frame size functions cannot be used.

Spec

10-25

■ Frame Rates and Valid Pixels ACS-1 M40 Normal mode (1/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
35,000 or less	1280	896	28.16	19.712	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
40,000	1280	800	28.16	17.6	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
45,000	1280	720	28.16	15.84	16:9
	1280	704	28.16	15.488	Split
	1008	720	22.176	15.84	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
50,000	1280	640	28.16	14.08	Split
	1280	576	28.16	12.672	Split
	1008	640	22.176	14.08	Split
	672	576	14.784	12.672	Split
	672	512	14.784	11.264	Split
	512	512	11.264	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split

■ Frame Rates and Valid Pixels ACS-1 M40 Normal mode (2/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
60,000	1280	528	28.16	11.616	Split
	1008	528	22.176	11.616	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	Split
	336	256	7.392	5.632	Split
65,000	1280	480	28.16	10.56	Split
	1280	448	28.16	9.856	Split
	1008	480	22.176	10.56	Split
	672	480	14.784	10.56	Split
	672	448	14.784	9.856	Split
	640	480	14.08	10.56	VGA (4:3)
	336	256	7.392	5.632	Split
75,000	1280	400	28.16	8.8	Split
	1280	352	28.16	7.744	Split
	1008	400	22.176	8.8	Split
	672	400	14.784	8.8	Split
	672	352	14.784	7.744	Split
	336	256	7.392	5.632	VGA (4:3)
100,000	1280	288	28.16	6.336	Split
	1008	288	22.176	6.336	Split
	672	288	14.784	6.336	Split
	336	256	7.392	5.632	Split
120,000	1280	224	28.16	4.928	Split
	1280	192	28.16	4.224	Split
	1008	224	22.176	4.928	Split
	672	224	14.784	4.928	Split
	336	224	7.392	4.928	Split
	336	192	7.392	4.224	Split

Spec

10-27

■ Frame Rates and Valid Pixels ACS-1 M40 Normal mode (3/3)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
150,000	1280	176	28.16	3.872	Split
	1280	128	28.16	2.816	Split
	1008	176	22.176	3.872	Split
	672	176	14.784	3.872	Split
	336	176	7.392	3.872	Split
	336	128	7.392	2.816	Split
200,000	1280	112	28.16	2.464	Split
	1280	96	28.16	2.112	Split
	1280	64	28.16	1.408	Split
	1008	112	22.176	2.464	Split
	672	112	14.784	2.464	Split
	336	112	7.392	2.464	Split
	336	96	7.392	2.112	Split
	336	64	7.392	1.408	Split
300,000	1280	48	28.16	1.056	Split
	336	48	7.392	1.056	Split
400,000	1280	32	28.16	0.704	Split
	336	32	7.392	0.704	Split
500,000	1280	16	28.16	0.352	Split
	336	16	7.392	0.352	Split
700,000	1280	16	28.16	0.352	Split
	336	16	7.392	0.352	Split

Custom Frame Size : In units of 16 horizontal pixels and 16 vertical pixels

✔CHECK ☆ • 35,000 or less includes 30,000, 20,000, 10,000, 5,000, 2,000, 1,000, 500, 100, 60 and 50 fps.

■ Frame Rates and Valid Pixels ACS-1 M40 Boost mode

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
40,000	1280	896	28.16	19.712	Split
45,000	1280	896	28.16	19.712	Split
50,000	1280	896	28.16	19.712	Split
60,000	1280	896	28.16	19.712	Split
65,000	1280	896	28.16	19.712	Split
75,000	1280	800	28.16	17.6	Split
100,000	1280	576	28.16	12.672	Split
	672	576	14.784	12.672	Split
120,000	1280	448	28.16	9.856	Split
	672	448	14.784	9.856	Split
150,000	1280	352	28.16	7.744	Split
	672	352	14.784	7.744	Split
200,000	1280	224	28.16	4.928	Split
	336	224	7.392	4.928	Split
300,000	1280	96	28.16	2.112	Split
	336	96	7.392	2.112	Split
400,000	1280	64	28.16	1.408	Split
	336	64	7.392	1.408	Split
500,000	1280	32	28.16	0.704	Split
	336	32	7.392	0.704	Split
700,000	1280	32	28.16	0.704	Split
	336	32	7.392	0.704	Split

Attention • Boost mode supports only Mono, not color.

CHECK • Boost mode is preset only.
• Custom frame rate and custom frame size functions cannot be used.

Spec

■Frame Rates and Valid Pixels ACS-1 M40 Boost 4 mode

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
75,000	1280	896	28.16	19.712	Split
100,000	1280	896	28.16	19.712	Split
120,000	1280	896	28.16	19.712	Split
150,000	1280	704	28.16	15.488	Split
200,000	1280	448	28.16	9.856	Split
200,000	672	448	14.784	9.856	Split
300,000	1280	192	28.16	4.224	Split
300,000	336	192	7.392	4.224	Split
400,000	1280	128	28.16	2.816	Split
400,000	336	128	7.392	2.816	Split
500,000	1280	64	28.16	1.408	Split
500,000	336	64	7.392	1.408	Split
700,000	1280	64	28.16	1.408	Split
700,000	336	64	7.392	1.408	Split

Attention
- Boost 4 mode supports only Mono, not color.
- Please contact us or our distributors for models compatible with Boost 4 mode.

CHECK
- Boost 4 mode is preset only.
- Custom frame rate and custom frame size functions cannot be used.

■ Frame Rates and Valid Pixels ACS-1 M30E Normal mode (1/4)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
25,000 or less	1280	896	28.16	19.712	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	1:1
	336	256	7.392	5.632	Split
27,000	1280	896	28.16	19.712	Split
	1280	832	28.16	18.304	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	1:1
	336	256	7.392	5.632	Split
30,000	1280	800	28.16	17.6	Split
	1280	736	28.16	16.192	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	15.84	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	1:1
	336	256	7.392	5.632	Split

CHECK • 25,000 or less includes 20,000, 10,000, 5,000, 2,000, 1,000, 500, 100, 60 and 50 fps.

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■ Frame Rates and Valid Pixels ACS-1 M30E Normal mode (2/4)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
35,000	1280	704	28.16	15.488	Split
	1280	672	28.16	14.784	Split
	1280	640	28.16	14.08	Split
	1008	704	22.176	15.488	Split
	672	672	14.784	14.784	1:1
	672	640	14.784	14.08	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	1:1
	336	256	7.392	5.632	Split
40,000	1280	592	28.16	13.024	Split
	1280	576	28.16	12.672	Split
	1008	592	22.176	13.024	Split
	672	576	14.784	12.672	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	1:1
	336	256	7.392	5.632	Split
45,000	1280	528	28.16	11.616	Split
	1008	528	22.176	11.616	Split
	672	512	14.784	11.264	Split
	336	256	7.392	5.632	Split
50,000	1280	464	28.16	10.208	Split
	1280	448	28.16	9.856	Split
	1280	416	28.16	9.152	Split
	1008	464	22.176	10.208	Split
	672	464	14.784	10.208	Split
	672	448	14.784	9.856	Split
	672	416	14.784	9.152	Split
	336	256	7.392	5.632	Split

■ Frame Rates and Valid Pixels ACS-1 M30E Normal mode (3/4)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
60,000	1280	368	28.16	8.096	Split
	1008	368	22.176	8.096	Split
	672	368	14.784	8.096	Split
	336	256	7.392	5.632	Split
65,000	1280	336	28.16	7.392	Split
	1280	320	28.16	7.04	VGA (4:3)
	1008	336	22.176	7.392	Split
	672	336	14.784	7.392	Split
	336	336	7.392	7.392	Split
	336	320	7.392	7.04	Split
	336	256	7.392	5.632	Split
75,000	1280	288	28.16	6.336	Split
	1280	256	28.16	5.632	Split
	1280	224	28.16	4.928	Split
	1008	288	22.176	6.336	Split
	672	288	14.784	6.336	Split
	672	224	14.784	4.928	Split
	336	256	7.392	5.632	Split
100,000	1280	208	28.16	4.576	Split
	1280	192	28.16	4.224	Split
	1280	128	28.16	2.816	Split
	1008	208	22.176	4.576	Split
	672	208	14.784	4.576	Split
	336	208	7.392	4.576	Split
	336	192	7.392	4.224	Split
	336	128	7.392	2.816	Split
120,000	1280	160	28.16	3.52	Split
	1008	160	22.176	3.52	Split
	672	160	14.784	3.52	Split
	336	160	7.392	3.52	Split

Spec

10-33

■ Frame Rates and Valid Pixels ACS-1 M30E Normal mode (4/4)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
150,000	1280	112	28.16	2.464	Split
	1280	96	28.16	2.112	Split
	1008	112	22.176	2.464	Split
	672	112	14.784	2.464	Split
	336	112	7.392	2.464	Split
	336	96	7.392	2.112	Split
200,000	1280	64	28.16	1.408	Split
	336	64	7.392	1.408	Split
220,000	1280	48	28.16	1.056	Split
	336	48	7.392	1.056	Split

■ Frame Rates and Valid Pixels ACS-1 M30E Boost mode

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
30,000	1280	896	28.16	19.712	Split
35,000	1280	896	28.16	19.712	Split
40,000	1280	896	28.16	19.712	Split
45,000	1280	896	28.16	19.712	Split
50,000	1280	896	28.16	19.712	Split
60,000	1280	736	28.16	16.192	Split
65,000	1280	672	28.16	14.784	Split
	672	672	14.784	14.784	1:1
75,000	1280	576	28.16	12.672	Split
	672	576	14.784	12.672	Split
100,000	1280	416	28.16	9.152	Split
	672	416	14.784	9.152	Split
120,000	1280	320	28.16	7.04	Split
	336	320	7.392	7.04	Split
150,000	1280	224	28.16	4.928	Split
	336	224	7.392	4.928	Split
200,000	1280	128	28.16	2.816	Split
	336	128	7.392	2.816	Split
220,000	1280	96	28.16	2.112	Split
	336	96	7.392	2.112	Split

ATTENTION
- Boost mode supports only Mono, not color.
- ACS-1 M30/M30E does not have a boost 4 mode.

CHECK
- Boost mode is preset only.
- Custom frame rate and custom frame size functions cannot be used.

Spec

■ Frame Rates and Valid Pixels ACS-1 M30 Normal mode (1/4)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
25,000 or less	1280	896	28.16	19.712	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	1:1
	336	256	7.392	5.632	Split
27,000	1280	896	28.16	19.712	Split
	1280	832	28.16	18.304	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	16.896	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	1:1
	336	256	7.392	5.632	Split
30,000	1280	800	28.16	17.6	Split
	1280	736	28.16	16.192	Split
	1280	720	28.16	15.84	16:9
	1008	768	22.176	15.84	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	1:1
	336	256	7.392	5.632	Split

Custom Frame Size : In units of 16 horizontal pixels and 16 vertical pixels

CHECK
• 25,000 or less includes 20,000, 10,000, 5,000, 2,000, 1,000, 500, 100, 60 and 50 fps.

10-36

■ Frame Rates and Valid Pixels ACS-1 M30 Normal mode (2/4)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
35,000	1280	704	28.16	15.488	Split
	1280	672	28.16	14.784	Split
	1280	640	28.16	14.08	Split
	1008	704	22.176	15.488	Split
	672	672	14.784	14.784	1:1
	672	640	14.784	14.08	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	1:1
	336	256	7.392	5.632	Split
40,000	1280	592	28.16	13.024	Split
	1280	576	28.16	12.672	Split
	1008	592	22.176	13.024	Split
	672	576	14.784	12.672	Split
	672	512	14.784	11.264	Split
	640	480	14.08	10.56	VGA (4:3)
	512	512	11.264	11.264	1:1
	336	256	7.392	5.632	Split
45,000	1280	528	28.16	11.616	Split
	1008	528	22.176	11.616	Split
	672	512	14.784	11.264	Split
	336	256	7.392	5.632	Split
50,000	1280	464	28.16	10.208	Split
	1280	448	28.16	9.856	Split
	1280	416	28.16	9.152	Split
	1008	464	22.176	10.208	Split
	672	464	14.784	10.208	Split
	672	448	14.784	9.856	Split
	672	416	14.784	9.152	Split
	336	256	7.392	5.632	Split

Spec

(00457)H

■ Frame Rates and Valid Pixels ACS-1 M30 Normal mode (3/4)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
60,000	1280	368	28.16	8.096	Split
	1008	368	22.176	8.096	Split
	672	368	14.784	8.096	Split
	336	256	7.392	5.632	Split
65,000	1280	336	28.16	7.392	Split
	1280	320	28.16	7.04	VGA (4:3)
	1008	336	22.176	7.392	Split
	672	336	14.784	7.392	Split
	336	336	7.392	7.392	Split
	336	320	7.392	7.04	Split
	336	256	7.392	5.632	Split
75,000	1280	288	28.16	6.336	Split
	1280	256	28.16	5.632	Split
	1280	224	28.16	4.928	Split
	1008	288	22.176	6.336	Split
	672	288	14.784	6.336	Split
	672	224	14.784	4.928	Split
	336	256	7.392	5.632	Split
100,000	1280	208	28.16	4.576	Split
	1280	192	28.16	4.224	Split
	1280	128	28.16	2.816	Split
	1008	208	22.176	4.576	Split
	672	208	14.784	4.576	Split
	336	208	7.392	4.576	Split
	336	192	7.392	4.224	Split
	336	128	7.392	2.816	Split
120,000	1280	160	28.16	3.52	Split
	1008	160	22.176	3.52	Split
	672	160	14.784	3.52	Split
	336	160	7.392	3.52	Split

■ Frame Rates and Valid Pixels ACS-1 M30 Normal mode (4/4)

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
150,000	1280	112	28.16	2.464	Split
	1280	96	28.16	2.112	Split
	1008	112	22.176	2.464	Split
	672	112	14.784	2.464	Split
	336	112	7.392	2.464	Split
	336	96	7.392	2.112	Split
200,000	1280	64	28.16	1.408	Split
	336	64	7.392	1.408	Split
250,000	1280	48	28.16	1.056	Split
	336	48	7.392	1.056	Split

Spec

(00457)H

■ Frame Rates and Valid Pixels ACS-1 M30 Boost mode

Maximum Frame Rate (fps)	Valid Pixels		Valid Image Area (mm)		Horizontal-Vertical Ratio (Size)
	Horizontal	Vertical	Horizontal	Vertical	
30,000	1280	896	28.16	19.712	Split
35,000	1280	896	28.16	19.712	Split
40,000	1280	896	28.16	19.712	Split
45,000	1280	896	28.16	19.712	Split
50,000	1280	896	28.16	19.712	Split
60,000	1280	736	28.16	16.192	Split
65,000	1280	672	28.16	14.784	Split
	672	672	14.784	14.784	1:1
75,000	1280	576	28.16	12.672	Split
	672	576	14.784	12.672	Split
100,000	1280	416	28.16	9.152	Split
	672	416	14.784	9.152	Split
120,000	1280	320	28.16	7.04	Split
	336	320	7.392	7.04	Split
150,000	1280	224	28.16	4.928	Split
	336	224	7.392	4.928	Split
200,000	1280	128	28.16	2.816	Split
	336	128	7.392	2.816	Split
250,000	1280	96	28.16	2.112	Split
	336	96	7.392	2.112	Split
300,000	1280	64	28.16	1.408	Split
	336	64	7.392	1.408	Split
400,000	1280	32	28.16	0.704	Split
	336	32	7.392	0.704	Split
500,000	1280	32	28.16	0.704	Split
	336	32	7.392	0.704	Split

⊘**ATTENTION**
- Boost mode supports only Mono, not color.
- ACS-1 M30 does not have a boost 4 mode.

↘**CHECK**☆
- Boost mode is preset only.
- Custom frame rate and custom frame size functions cannot be used.

■ Sensitivity

Mono	ISO 50,000 : ACS-1 ISO 100,000 : ACS-1 M60E/M60/M40E/M40/M30E/M30
Color	ISO 20,000 : ACS-1 M60E/M60/M40E/M40/M30E/M30

(About 51,980lx

Digital gain: MID, aperture: F4, Frame rate: 1000 frames/sec , Shutter: 16μs)

↘**CHECK**☆
- When the output signals for the subject have a reflectance of 89% become 100%, the illumination and aperture value for the subject are the aperture for the lens at that time.

Spec

10-41

■ Shutter

Shutter Format	Global electronic shutter
Method for Setting the Shutter Time	Select from presets / set custom
Presets	OPEN (50 frames, 60 frames is not possible, 1/100, 1/500, 1/1,000, 1/2,000, 1/5,000, 1/10,000, 1/20,000, 1/50,000, 1/100,000, 1/200,000, 1/333,333, 1/500,000

Custom Settings	0.4 to 100,000μs (= 100ms = 1/10s) :ACS-1 M60
	0.6 to 100,000μs (= 100ms = 1/10s) :ACS-1
	                                         :ACS-1 M40 / M30
	1.1 to 100,00μs (= 100ms = 1/10s) :ACS-1E
	                                         :ACS-1 M60E / M40E / M30E
	Exposure times longer than 1/frame rate cannot be set

Automatic Exposure	Setting: ON/OFF Function: Automatically adjusts the exposure time between 10μs and the shutter speed

■ Lens Mount

Mount Type	F Mount, C Mount (Select at purchase)
F Mount	NIKON F Mount, compatible with lenses without an aperture ring
C Mount	Vignetting due to the image resolution

■ Timing Compatibility with Existing Products

ACS-1 Reference Timing	Shutter exposure start timing (GX native)
Fx Compatible Timing	Shutter exposure end timing (K4 compat)

Recorder

■ Recording Memory

Installed Memory	64GB / 128GB / 256GB	
Memory Segment Partitions	64GB model	1GB×64, 2.1GB×32, 4.2GB×16, 8.5GB×8, 17GB×4, 34GB×2, 68GB×1
	128GB model	2.1GB×64, 4.2GB×32, 8.5GB×16, 17GB×8, 34GB×4, 68GB×2, 137GB×1
	256GB model	4.2GB×64, 8.5GB×32, 17GB×16, 34GB×8, 68GB×4, 137GB×2, 274GB×1

■ Pixel Bit Length

Image Sensor Output	12 bit	
Recording bits per pixel	Select from 8 / 10 / 12 bit	
	12 bit	Record image sensor output of 12 bit (high image quality)
	10 bit	Record image sensor output of high 10 bit
	8 bit	Record image sensor output of high 8 bit (long time)

Spec

■ Live Image Display

Modes to Display Live Images	VIEW mode, ARM mode, REC mode
Output Connector	DP connector (DisplayPort)
Refresh Rate	About 15 to About 30 frames/sec (frame size, depends on the character information display) •About 15 frames/sec Frame size 1,280 x 896, character information display present •About 30 frames/sec Frame size 1,280 x 896, no character information display

■ Recording Conditions

Recording Start Conditions	•ARM command (Network: ARM from MLink, USB2.0: ARM from V-PAD) •ARM command input signals (AUX connector GENERAL IN) •Autopilot ARM command •Recording end from segment or block (with multi-trigger recording or while switching auto segments)
Recording End Conditions	•Recording trigger signals (TRIG connector TRIGGER1 IN, REMOTE connector TRIGGER2 IN) •Trigger command (Network: REC from MLink, USB2.0: REC V-PAD) •Image trigger (when the image trigger function is enabled.) •Autopilot trigger command •Stop recording in all memory segment areas (during burst recording · linear recording) •Stop command (Network: STOP from MLink, USB2.0: STOP from V-PAD) •Autopilot stop command
Pause Recording Conditions during the REC Mode	During operation in the burst trigger mode, the trigger signals are at the disabled level while in the REC mode Pause command during the linear recording mode and the REC mode (Network: TRIG button in MLink, USB2.0: TRIG button from the V-PAD)
Restart Recording Conditions during the REC Mode	During operation in the burst trigger mode, the trigger signals are at the enabled level while in the REC mode Restart command during the linear recording mode and the PAUSE mode (Network: ARM button in MLink, USB2.0: ARM button from the V-PAD)

Spec

10-45

■ Recording Method

Normal Trigger	Normal recording trigger
Multi-Trigger	The selected segment is partitioned into 2 to 64 blocks and recording is performed by automatically switching blocks at each trigger signal

Event Trigger	First trigger signal:
	    Trigger
	2nd and subsequent trigger signals
	    Record external trigger signals as events
	# of pulses that can be input
	    63

Burst Trigger	Recording when the external trigger signal is ON
Linear	In LINEAR, recording by controlling the record/pause without using trigger signals
Multi-Manual	Recording repeated events by specifying the number of frames per block

■ Trigger Timing

START	The trigger point is about 5% before the beginning of the recording memory
CENTER	The trigger point is the center of the recording memory (About 50%)
END	The trigger point is about 5% before the end of the recording memory
CUSTOM (specify %)	The trigger point is at a preset value (-100 to 100%), set at 1% intervals
CUSTOM (specify frame number)	The trigger point is at a preset value (frame number)

(00457)H

■ Simultaneous Recording Data

Recorded Scene Number	Closed caption method
Recording Trigger Mode Setting	Closed caption method
Frame Rate	Closed caption method
Frame Size	Closed caption method
Shutter Speed	Closed caption method
Recording Image Quality Settings	Closed caption method
Recording Comments	Closed caption method
Trigger Time	Closed caption method
Internal Standard Time (or IRIG-B Time)	Simultaneous Recording Method
Exposure Start Time	Simultaneous recording method, time stamp, minutes and seconds, 0.1µsec units
Exposure End Time	Simultaneous recording method, time stamp, minutes and seconds, 0.1µsec units
Frame Count	Simultaneous recording method, time stamp, memory address information
Trigger Time	Simultaneous recording method, time stamp, day/hour/ min/sec, 0.1µsec units
Sequence Count	Simultaneous recording method, time stamp, recording sequence information
Signal Status	Simultaneous recording method, time stamp, Trigger, EST, Event, IRIG Lock, Sensor Flag bit identification
Recording Time	Simultaneous recording method, time stamp, date and time

Closed caption method :	Image and information recorded separately, synthesis display method, recorded in the system controller at the point of trigger input
Note) Simultaneous Recording Method:	Method recording image and information together, recorded in image memory
Note) Time Stamp:	Simultaneous recording data for each frame

10-47

Spec

Video Converter

■ Video Output (DisplayPort)

Output Signals	DP: DisplayPort Signal
Image Refresh Rate	About 15 to About 30 frames/sec (frame size, depends on the character information display) •About 15 frames/sec Frame size 1,280 x 896, character information display present •About 30 frames/sec Frame size 1,280 x 896, no character information display
Display Resolution	V-PAD: 1,280 × 720 Other monitors: depends on the monitor resolution
Gradation Expression	YUV each 8 bit (YUV422) (at the internal digital end stage)

■ Video Output (SDI)

Output Signals	SDI: 3G-SDI signals (1080p/60 compatible only with Level A)
Image Refresh Rate	About 60 frames/sec Display resolution: 1920x1080
Display Resolution	1920 × 1080
Gradation Expression	YUV each 10 bit (YUV422) (at the internal digital end stage)
Display Area	The same as with the DisplayPort But the valid display area is 1,280x896 of the display resolution of 1,920x1,080 A black screen is displayed if not the valid display area
On-Screen Display	None
Screen during Powerup	A color bar is shown while the camera firmware starts up

(00457)H

■Image Quality Settings

Gain	LOW, MID, HIGH
White Balance	AUTO, 3100K, 5000K, 9000K, REG
Enhance	OFF, LOW, MID, HIGH
Gamma	OFF, LOW, MID
Chroma	0%, 50%, 100%, 150%, 200%
Knee	OFF, ON
RGB Matrix	OFF, ON

■Display Area

Zoom	FIT1 (shown on 100% of the screen) FIT2 (About 80% underscanned shrunk screen display, the margins are black) 1/4x, 1/2x, 1x, 2x, 4x
Scroll	Display the zoomed image cut to the display area, the display location can be set
Show Segment Frame Box	Show the segment frame box during the VIEW mode and low light mode, can use together with zoom
Show Screen Center Mark	Show/hide CAFM (Camera Alignment Fiducial Mark), mark can be specified as white or black

■Playback

Frame Rate	Fast forward, 1 to 1920 frames/sec, forward or reverse
Jump Frames	Trigger point, recording start point, recording end point
Play Mode	Single playback, loop playback
Set Play Range	Set starting and ending points

System Control

■Status LED (1/2)

POWER SW LED	Lit green:	Power ON　Camera power ON state
	Not lit:	Power OFF　Camera power OFF state
ETHERNET LED	Yellow-green:	Linking in 1000BASE-T
	Orange:	Linking in 100BASE-TX
	Not lit:	Network not connected or power OFF
CAM MODE LED	Orange:	REC mode (Camera image output, saving camera image in memory after trigger detection)
	Blue:	STOP/READY mode (Memory image output. Play or fast forward mode immediately after startup)
	White:	VIEW mode (Camera image output, memory contents retained for finished recordings)
	Magenta:	ARM mode (Camera image output, deleting memory contents for finished recordings and saving camera images in the memory)
	Not lit:	Power OFF, or starting up
	Blinking:	Set to EST mode and EST pulse is input. Only for VIEW, ARM, REC mode.

■Status LED (2/2)

PWR LED	Green:	Power ON, normal state
	Red:	Power ON, fail state
	Orange:	Power OFF While power is being supplied, the power to the camera is in the OFF state from the power switch and the external power voltage is in a normal state, within the specified range (20 to 32V).
	Blinking Red:	During startup and shutting down
	Blinking orange:	Power OFF While external power is being supplied, the power to the camera is in the OFF state from the power switch and the external power voltage is in an abnormal state, outside the specified range (20 to 32V).
	Not lit:	Power OFF State where there is no external power
	Alternating red and green:	Thermal shutdown state
	Note) In the event of a thermal shutdown, turn the external power switch OFF once and then turn it back on to restore. Note) A fail state may occur when the camera is starting up or during failure detection, abnormal power voltage detection, elevated sensor temperature detection, abnormal trigger signal detection or abnormal setting detection.	

Spec

■Show Superimposed Information (Show on Screen) (1/3)

Scene Number	0 to 65,535	
Trigger Mode	START, CENTER, END, -9999 to +100 (Numerals in %: CUSTOM, If greater than -9999% [-****]), (Frame number: multi-manual)	
Trigger Date/Time	Trigger input date/time, if not recorded yet [*], during ARM/REC [0]	
Image Refresh Rate	Frame:	Frame number of the currently displayed screen with the trigger frame at 0 (integer)
	Time:	Relative time (units in microseconds) of the currently displayed screen with the trigger frame time or the trigger detection time at 0
	ATime:	Absolute time (units in microseconds, 24-hour clock) of the currently displayed screen, showing the "trigger standard" time or the "exposure center" time with the cycle of the frame number and the trigger frame time as the trigger detection time
	Memory%:	Display in % in the recording range for the currently displayed screen, with the beginning at 0% and the end at 100%
Recording Comments	Show the recording comments under the top OSD	
Auto Pilot Comments	Show the processing step while in auto pilot	
Memory Segment Numbers	1 to 64	
Modes	LLIGHT (LOW LIGHT), STOP, VIEW, ARM, REC, PAUSE, SAVE, EXPORT, FAIL	
Playback Speed	1 to 1920 (integers in fps)	
Frame Rate	50 to 1,000,000 (integers in pps) when preset, EST1, EST2	
Event Frame	A blue mark ♦ will be displayed to the top left of the frame count display area at the frame where the EST2 event signal is input	

■Show Superimposed Information (Show on Screen) (2/3)

Trigger Frame	A yellow mark ● will be displayed to the top left of the frame count display area at the frame where the trigger signal or the recording method event signal (= trigger signal) is input.
Show IRIG Lock	Displays the synchronization status in the top left part of the frame count display area if the time is set to IRIG synchronization. There will be an [I] in the green background when synchronized to the IRIG signals, and an [I] in the red background when not synchronized to IRIG signals.

Spec

■Show Superimposed Information (Show on Screen) (3/3)

Show Warnings	Show the following warnings in the center of the screen if generated Abnormal frame rate (ON/OFF) Abnormal interruption (ON/OFF) Outside the range of valid sensor temperatures Camera head Not connected/abnormal communication/abnormal EEPROM Abnormal start recording/abnormal cancel recording Abnormal I2C device communication Abnormal input voltage (Low voltage : 20V or less) Abnormal input voltage (High voltage : 32V or more) Trigger signal assert during VIEW/ARM start Startup error RTC battery died (ON/OFF) Note) RTC battery:internal clock battery Black Balance data inconsistency (ON/OFF) Black Balance data creation error (signals not processed when using EST) USB HDD format error /save error/load error MCFF transfer error USB driver deadlock, timeout Abnormal voltage: image memory outage, or abnormal image memory initialization setting Image memory protect (won't ARM) Internal USB memory not detected Auto pilot initialization error, sequence execution error

Input/Output Connector

■DC-IN Connector

Application	Power input
Model	LEMO EEG.3B.307
Compatible Plug	LEMO FGG.3B.307
Power Voltage	DC20 - 32V
Power Consumed	ACS-1 About 300W 35,000pps, ARM mode, full resolution, when peripheral devices are not connected
Power Protection	Reverse polarity: As per the installed protection IC
	Over-voltage: As per the installed protection IC, shutdown at 34.5VDC

Pin Configuration				
Pin No.	Name	Direction	Function • Input/Output Level	Notes
1-3	DC24V IN	IN	DC +24V input	
4-6	DC24V RTN	IN	DC +24V return	
7	NC	-	Not Connected	
shell	FRAME GND	-	Frame ground	

Spec

■AUX Connector

Application	Discrete control signal input/output	
Model	LEMO EEG.1B.310	
Compatible Plug	LEMO FGG.1B.310	
GENERAL Input	Signal Level:	TTL level, 5V pull-up, isolator L level:-0.5VDC (minimum applied voltage) to 0.5VDC H level: 2VDC to 5.5VDC (maximum applied voltage)
	Function:	Switch to the ARM mode for H → L when in the state where switching to the ARM mode is possible Contact input possible, polarity inverting function
GENERAL Output	Signal Level:	5V CMOS output, isolator
	Function:	Select from TRIG OUT, VD OUT, ARM status output, FAULT status output Polarity inverting function

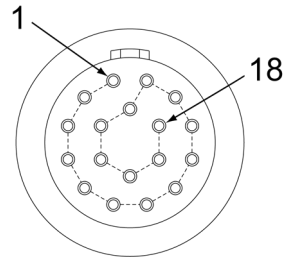| Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	GENERAL IN	IN	TTL, contact	
2	GENERAL IN RTN	IN	TTL, contact	Isolated ground
3	GENERAL OUT3	OUT	5V CMOS	
4	GENERAL OUT3 RTN	OUT	5V CMOS	Isolated ground
5	GENERAL OUT1	OUT	5V CMOS	
6	GENERAL OUT1 RTN	OUT	5V CMOS	Isolated ground
7	GENERAL OUT2	OUT	5V CMOS	
8	GENERAL OUT2 RTN	OUT	5V CMOS	Isolated ground
9	NC			
10	NC			
shell	FRAME GND		Frame ground	

Pin Configuration Figure (from the side of the engaged connector)

Spec

(00457)H

■REMOTE Connector

Application	Remote operation (compatible with the GX series J3 connector)	
Model	LEMO EEG.2B.318	
Compatible Plug	LEMO FGG.2B.318	
Ethernet	1000BASE-T (IEEE802.3ab), 100BASE-TX (IEEE802.3u) DHCP compatible, isolator	
EST2/EVENT Input	Signal Level:	TTL level, 5V pull-up, isolator L level: -0.5VDC (minimum applied voltage) to 0.5VDC H level: 2VDC to 5.5VDC (maximum applied voltage)
	Function:	Set to the EST mode and start exposure at H → L during the ARM or REC mode and photograph one image Synchronization precision of 40ns or less Contact input possible, polarity inverting function During EVENT input, the signal level is recorded together with the image
IRIG-B Input	Signal Level:	3Vpp (1 to10Vpp), high impedance, insulating transformer input
	Function:	IRIG Standard 200-98
TRIG2 Input	Signal Level:	Current loop with the photocoupler, isolator Maximum applied voltage: ±32V Current limiting resistance: 1500 Ω
	Function:	Trigger enabled at 5V and higher, polarity inverting function
EPO Output	Signal Level:	5V CMOS, isolator
	Function:	Falling (H → L) : Start exposure Rising (L → H) : End exposure Polarity inverting function

| Power Control (PWRCNT) Input | Signal Level: | TTL level, 5V pull-up, isolator
L level: -0.5VDC (minimum applied voltage) to 0.8VDC
H level: 2VDC to 5.5VDC (maximum applied voltage) |
| | Function: | H: Power ON
L: Power OFF
Contact input possible, no polarity inverting function |

Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	MDI 0+	I/O	10/100/1000BASE-T Interface	
2	MDI 0-	I/O	10/100/1000BASE-T Interface	
3	MDI 1+	I/O	10/100/1000BASE-T Interface	
4	MDI 1-	I/O	10/100/1000BASE-T Interface	
5	MDI 2+	I/O	10/100/1000BASE-T Interface	
6	MDI 2-	I/O	10/100/1000BASE-T Interface	
7	MDI 3+	I/O	10/100/1000BASE-T Interface	
8	MDI 3-	I/O	10/100/1000BASE-T Interface	
9	EST2/EVENT IN	IN	TTL, contact	Isolator
10	EST2/EVENT IN RTN	IN	TTL, contact	Isolated ground
11	IRIG-B IN	IN	High impedance	Isolation transformer
12	IRIG-B IN RTN	IN	High impedance	Isolation transformer
13	TRIG2 IN A	IN	Current loop, anode	Isolator
14	TRIG2 IN C	IN	Current loop, cathode	Isolator
15	EPO	OUT	5V CMOS	Isolator
16	EPO RTN	OUT	5V CMOS	Isolated ground
17	PWRCNT IN	IN	TTL, contact	Isolator
18	PWRCNT IN RTN	IN	TTL, contact	Isolated ground
shell	FRAME GND		Frame ground	

Spec

10-59

1

18

Pin Configuration Figure (from the side of the engaged connector)

(00457)H

■ TRIG Connector

Application	TRIG1 trigger signal input
Model	BNC receptacle
Compatible Plug	BNC plug

TRIG1 Input	Signal Level:	TTL level, 5V pull-up, isolator L level: -0.5VDC (minimum applied voltage) to 0.5VDC H level: 2VDC to 5.5VDC (maximum applied voltage)
	Function:	Trigger enabled at H → L, Contact input possible Polarity inverting function

Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	TRIG1 IN	IN	TTL, contact	Isolator
shell	TRIG1 IN RTN	IN	TTL, contact	Isolated ground

■ EST Connector

Application	EST1 signal input
Model	BNC receptacle
Compatible Plug	BNC plug
# of Connectors	1

EST1 Input	Signal Level:	TTL level, 5V pull-up, isolator L level :-0.5VDC (minimum applied voltage) to 0.5VDC H level: 2VDC to 5.5VDC (maximum applied voltage)
	Function:	Start exposure at H → L, contact input possible Polarity inverting function

Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	EST1 IN	IN	TTL, contact	Isolator
shell	EST1 IN RTN	IN	TTL, contact	Isolated ground

Spec

■ EPO Connector

Application	Exposure signal output	
Model	BNC receptacle	
Compatible Plug	BNC plug	
# of Connectors	1	
EPO Output	Signal Level:	5V CMOS, isolator
	Function:	Polarity inverting function

Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	EPO	OUT	5V CMOS	Isolator
shell	EPO RTN	OUT	5V CMOS	Isolated ground

10-62

■USB2.0 Connector

Application	USB device connection
Model	USB Standard-A receptacle
Compatible Plug	USB Standard-A plug
# of Connectors	1
Standard	USB2.0 standard, USB HOST, exFAT compatible

Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	VBUS	OUT	USB power output, 5V · 1.0A	
2	D-	I/O	USB2.0 HS signals	
3	D+	I/O	USB2.0 HS signals	
4	GND	OUT	USB power output return	
shell	FRAME GND	-		

■USB2.0 Connector (For V-PAD Power Supply)

Application	USB device connection
Model	USB Standard-A receptacle
Compatible Plug	USB Standard-A plug
# of Connectors	1
Standard	USB2.0 standard

Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	VBUS	OUT	USB power output, 5V · 1.0A	
2	NC			
3	NC			
4	GND	OUT	USB power output return	
shell	FRAME GND	-		

Spec

10-63

■USB3.0 connector

Application	USB device connection
Model	USB Standard-A receptacle (molex 48409-0003)
Compatible Plug	USB Standard-A plug
# of Connectors	1
Standard	USB3.0 standard

Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	VBUS	OUT	USB power output, 5V · 1.0A	
2	D-	I/O	USB2.0 HS signals	
3	D+	I/O	USB2.0 HS signals	
4	GND	OUT	USB power output return	
5	SSTX-	OUT	USB 3.0 SS transmitting signals -	
6	SSTX+	OUT	USB 3.0 SS transmitting signals +	
7	GND DRAIN	OUT		
8	SSRX-	IN	USB 3.0 SS receiving signals-	
9	SSRX+	IN	USB 3.0 SS receiving signals+	

■USB3.0microB connector

Application	USB device connection
Model	micro-B receptacle (HIROSE ZX360D-B-10P)
Compatible Plug	micro-B plug
# of Connectors	1
Standard	USB3.0 standard

Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	VBUS	OUT	USB power output, 5V · 0.9A	
2	D-	I/O	USB2.0 HS signals	
3	D+	I/O	USB2.0 HS signals	
4	ID	IN		
5	GND	OUT	USB power output return	
6	SSTX-	OUT	SS transmission -	
7	SSTX+	OUT	SS transmission +	
8	GND DRAIN	OUT		
9	SSRX-	IN	SS reception -	
10	SSRX+	IN	SS reception +	

■SDI connector

Application	Video output for the monitor
Model	BNC receptacle (HIROSE BNC (75) J-H.FLJ-BPA (40))
Compatible Plug	BNC plug
# of Connectors	1
Standard	SMPTE425M 1080p/60 compatible with Level A only
Output Signals	3G-SDI x 1 system, 1080p/60 compatible with Level A only
Gradation Expression	YUV (422) each 10 bit
Display Area	The same as with the DisplayPort. A black screen is displayed outside the valid display area.
On-Screen Display	None

Spec

10-65

■DisplayPort Connector

Application	DisplayPort video output
Model	DisplayPort receptacle (Molex 47272-0001)
Compatible Plug	DisplayPort plug
Standard	DisplayPort

Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	Main Lane 0+	OUT	High speed differential data signals	
2	GND			
3	Main Lane 0-	OUT	High speed differential data signals	
4	Main Lane 1+	OUT	High speed differential data signals	
5	GND			
6	Main Lane 1-	OUT	High speed differential data signals	
7	Main Lane 2+	OUT	High speed differential data signals	
8	GND			
9	Main Lane 2-	OUT	High speed differential data signals	
10	Main Lane 3+	OUT	High speed differential data signals	
11	GND			
12	Main Lane 3-	OUT	High speed differential data signals	
13	GND			
14	GND			
15	Aux +	I/O	Differential control signals	
16	GND			
17	Aux -	I/O	Differential control signals	
18	HPD	IN	Hot plug detection	
19	GND			
20	3.3V	OUT	Power output 3.3V · 500mA	

■SYNC-I Connector

Application	Synchronization signals · trigger signal input (connector for easy synchronization)	
Model	LEMO EEA.1B.308	
Compatible Plug	LEMO FGA.1B.308	
TRIG Input	Signal Level:	TTL level, 5V pull-up resistor 4700Ω, isolator L level: -0.5VDC (minimum applied voltage) to 0.5VDC H level: 2VDC to 5.5VDC (maximum applied voltage)
	Function:	Trigger enabled at H → L. Contact input possible. Polarity inverting function
EST Input	Signal Level:	TTL level, 5V pull-up resistor 4700Ω, isolator L level: -0.5VDC (minimum applied voltage) to 0.5VDC H level: 2VDC to 5.5VDC (maximum applied voltage)
	Function:	Set to the EST mode and start exposure at H → L with this input during the ARM or REC mode and photograph one image. Contact input possible. Polarity inverting function. Synchronization precision of 40ns or less. During EVENT input, the signal level is recorded together with the image.
IRIG Input	Signal Level:	LVDS signals, isolator
	Function:	Time synchronization as IRIG-B DCLS signals. If IRIG-B DCLS signals are input, the IRIG-B for the REMOTE connector are not compatible

Spec

10-67

SYNC-I Input	Signal Level:	TTL level, 5V pull-up resistor 4700Ω, isolator L level: -0.5VDC (minimum applied voltage) to 0.5VDC H level: 2VDC to 5.5VDC (maximum applied voltage)
	Function:	If EST, TRIG are input from the BNC connector, select either inputs from the SYNC-I connector as the decision signals. Select L:SYNC-I connector; Select H:BNC connector Connect with another ACS camera SYNC-O connector using a SYNC cable to access the L level and select the SYNC-I connector.

Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	TRIG IN	IN	TTL, contact	Isolator
2	TRIG IN RTN	IN	TTL, contact	Isolated ground
3	EST IN	IN	TTL, contact	Isolator
4	EST IN RTN	IN	TTL, contact	Isolated ground
5	NC			
6	IRIG IN P	IN	LVDS	Isolator
7	IRIG IN N	IN	LVDS	Isolator
8	SYNC-I_IN	IN	TTL, contact	Isolator
shell	FRAME GND		Frame ground	

■SYNC-O Connector

Application	Synchronization signals · trigger signal output (connector for easy synchronization)	
Model	LEMO EEG.1B.308	
Compatible Plug	LEMO FGG.1B.308	
TRIG Output	Signal Level:	5V CMOS, isolator.
	Function:	Trigger enabled at H → L. Polarity inverting function.
EST Output	Signal Level:	5V CMOS, isolator.
	Function:	EST input signals output as is. No polarity inverting function.
IRIG Output	Signal Level:	LVDS signals, isolator
	Function:	Time synchronization as IRIG-B DCLS signals.
SYNC-O Output	Signal Level:	Isolated ground
	Function:	For other ACS cameras, output a fixed L level to select the TRIG, EST signals output from SYNC-O for use.

Spec

Pin Configuration				
Pin No.	Name	Direction	Function · Input/Output Level	Notes
1	TRIG OUT	OUT	5V CMOS	Isolator
2	TRIG OUT RTN	OUT	5V CMOS	Isolated ground
3	EST OUT	OUT	5V CMOS	Isolator
4	EST OUT RTN	OUT	5V CMOS	Isolated ground
5	NC			
6	IRIG OUT P	OUT	LVDS	Isolator
7	IRIG OUT N	OUT	LVDS	Isolator
8	SYNC-O_OUT	OUT	L level fixed. Isolated ground	Isolated ground
shell	FRAME GND		Frame ground	

Format, Environment, Precision, Standards, Disposable ItemsDrawings

■ Format

External Dimensions (W×H×D)	W175×H175×D206mm (excluding the handle, connector, protruding parts and mount)
Weight	About 7.3kg (excluding the cables and options)
Tripod Screws	3/8-16UNC, Depth 19mm (large screws) x4

■ Environment

Operating Temperature and Humidity	0 to 40 °C, 30 to 80%RH (no condensation)
Storage Temperature and Humidity	-10 to 60 °C, 20 to 80%RH (no condensation)

■ Precision

Recording Time Precision	±0.01% or less Apply the value of the inverse of the Frame Rate (frequency for (1 sec or more) during a given time period as the time precision.
Method of Inspecting the Recording Time Precision	With the EPO signals output from the REMOTE connector as the Frame Rate for a given time period (1 sec or more), measure the frequency with a frequency counter.

■ Standards

Safety Standard	EN60950
Electromagnetic Compatibility	EN55032, EN55024, EN55035, FCC Part 15 Subpart B Class A

■ Disposable Items

Clock battery	Period of Use: 5 year Method of Replacement: Replacement by our company

Spec

Main Accessories, Options

■F Mount Adapter

External Dimensions (W×H×D)	118 × 118 × 37.2 mm
Weight	About 0.25 kg
Compatible Lens	F Mount lens (Vignetting may occur with some F Mount lens, depending on the image resolution)

■C Mount Adapter（Option）

External Dimensions (W×H×D)	118 × 118 × 8.2 mm
Weight	About 0.15 kg
Compatible Lens	C Mount lens (Vignetting may occur within a depth of 8mm of the mounting screws, depending on the image resolution)

■ Simple J3 Cable

Length	0.5 m	
Plug	Camera side:	LEMO FGG.2B.318
	ETHERNET:	RJ45 receptacle

■ ACS-1 KIT

CD-ROM · DVD-ROM	MLink DVD-ROM: DVD-ROM of the control software MLink
	ACS-1 user's guide: ACS-1 user's guide - electronic manual (this document)

■ ACS-1 Storage Case

External Dimensions (W×H×D)	629 × 497 × 353 mm
Weight	About 11.4kg

■ Tripod Plate (New type)

External Dimensions (W×H×D)	186 × 116 × 14 mm
Weight	About 0.25kg
Screw Specifications	Large tripod screws x4, small tripod screws x3, total depth of 14mm

■ Tripod Plate (Old type)

External Dimensions (W×H×D)	186 × 116 × 19 mm
Weight	About 0.35kg
Screw Specifications	Large tripod screws x4, small tripod screws x3, total depth of 19mm

Spec

■ Control Software MLink

PC	IBM PC compatible (DOS/V)
OS	Requires Microsoft　Windows 7 Ultimate / Professional (32/64bit) Windows 8 Pro (32/64bit) / Windows 8.1 Pro (32/64bit) Windows 10 (32/64bit) .NET Framework 4.6.2 or after
Memory	4GB or more (recommend 8GB or more)
Monitor	Color 1024 x 768 or higher (recommend 1920 ×1080 or higher)
HDD	2GB or more (not including the video data storage area)
Network	1000BASE-T (Category 5 or higher LAN Cable)
Optical Drive	DVD-ROM drive

■ AC Adapter

External Dimensions (W×H×D)	About 120 × 49.3 × 250 mm (not including connectors)
Weight	About 1.4 Kg
Operating Temperature and Humidity	0 to 70 °C, 5 to 95%RH (no condensation)
Storage Temperature and Humidity	-40 to 85 °C, 10 to 95%RH (no condensation)
connector	Camera side:　　　　　NANABOSHI NTE-243-RF AC side:　　　　　　　AC 3pin connector
Input	AC100 to 240V, 47 to 63Hz
Output	DC28V, maximum of 14.29A

■ DC Cable between AC Adapter -DRP

Length	2.9 m
Plug	AC Adapter side:　　NANABOSHI NET-243-PM Camera side:　　　　LEMO　FGG.3B.307.CLAD10Z

■ V-PAD (Option)

External Dimensions (W×H×D)	294 × 194 × 12 mm
Weight	0.67 kg (main unit)
Operating Temperature and Humidity	0 to 50 °C, 20 to 90%RH (no condensation)
Storage Temperature and Humidity	-20 to 60 °C, 10 to 90%RH (no condensation)
Plug	HDMI (TypeA), Rear dock port
Cable Length	1.2m cable for On-Lap dock port DisplayPort-HDMI conversion Active Cable 0.215m
LCD Display	1920 x1080 dot, color, with backlight

■ V-PAD + Camera Platform Set (Option)

Configuration	V-PAD (Option), camera platform (for securing the V-PAD to the camera)
External Dimensions (W×H×D)	100 × 250 × 64 mm (V-PAD (Option) excluded)
Weight	0.45 kg (V-PAD (Option) excluded)
V-PAD side securing screws	M2 (3)
Camera side securing screws	1/4-20UNC (mini tripod screws)

Spec

(00457)H

■ J3 Branch Cable （Option）

Length	0.5 m
Plug	Camera side： LEMO FGG.2B.318 ETHERNET： RJ45 receptacle EST2： BNC plug IRIG-B： BNC plug TRIG2： BNC plug EPO： BNC plug PWRCNT： BNC plug

■ ACS AUX Cable （Option）

Length	0.5 m
Plug	Camera side： LEMO FGG.1B.310 GENERAL-I： BNC plug GENERAL-O1： BNC plug GENERAL-O2： BNC plug GENERAL-O3： BNC plug

■ ACS SYNC Cable （Option）

Length	3.0 m, 5.0 m, 7.5 m, 10.0 m, 15.0 m, 20.0 m
Plug	SYNC-O side plug： LEMO FGG.1B.308 SYNC-I side plug： LEMO FGA.1B.308

Drawings

■Drawing of the MEMRECAM ACS-1 Camera(Old body)
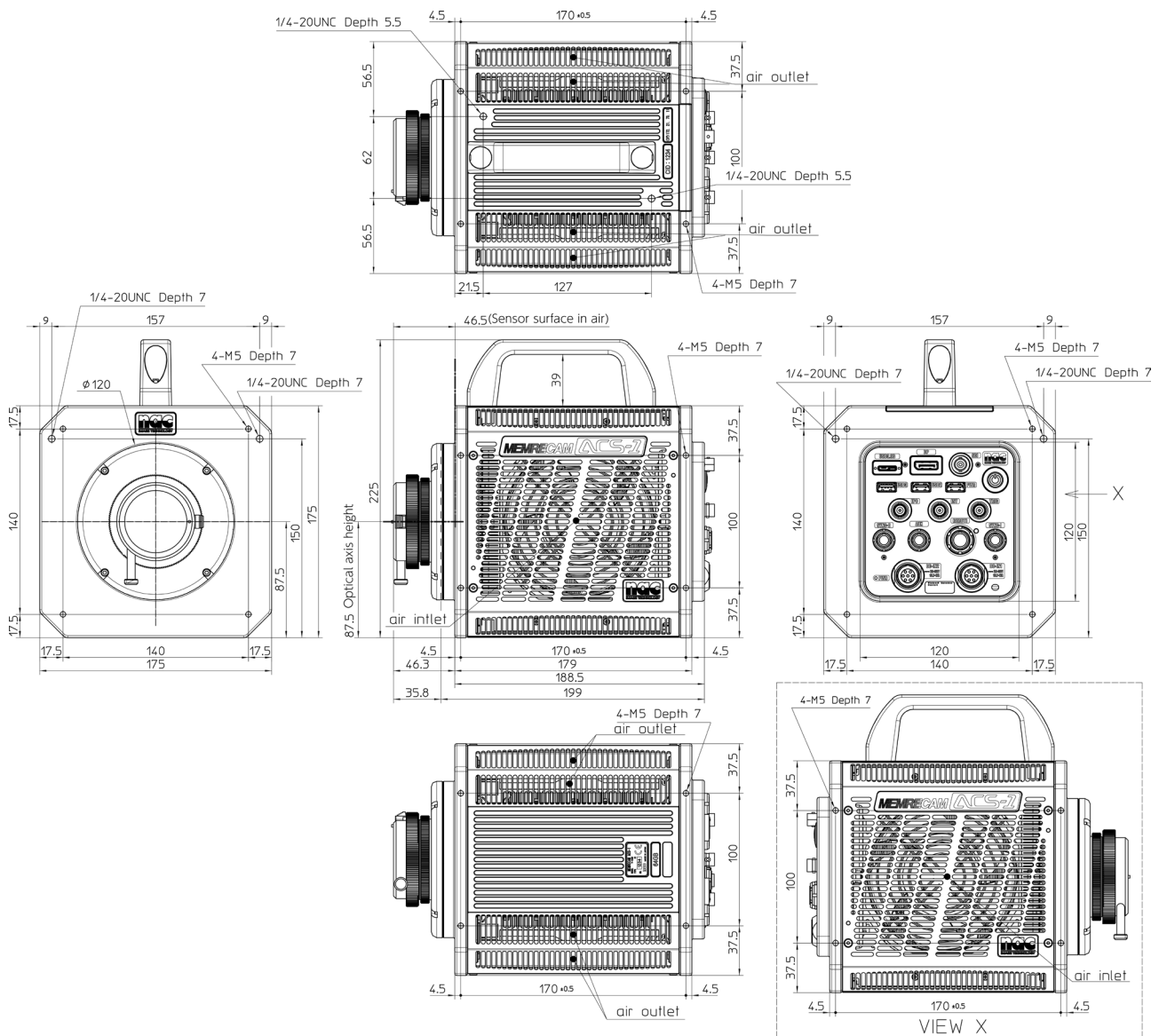
Spec

■Drawing of the MEMRECAM ACS-1 Camera(New body)
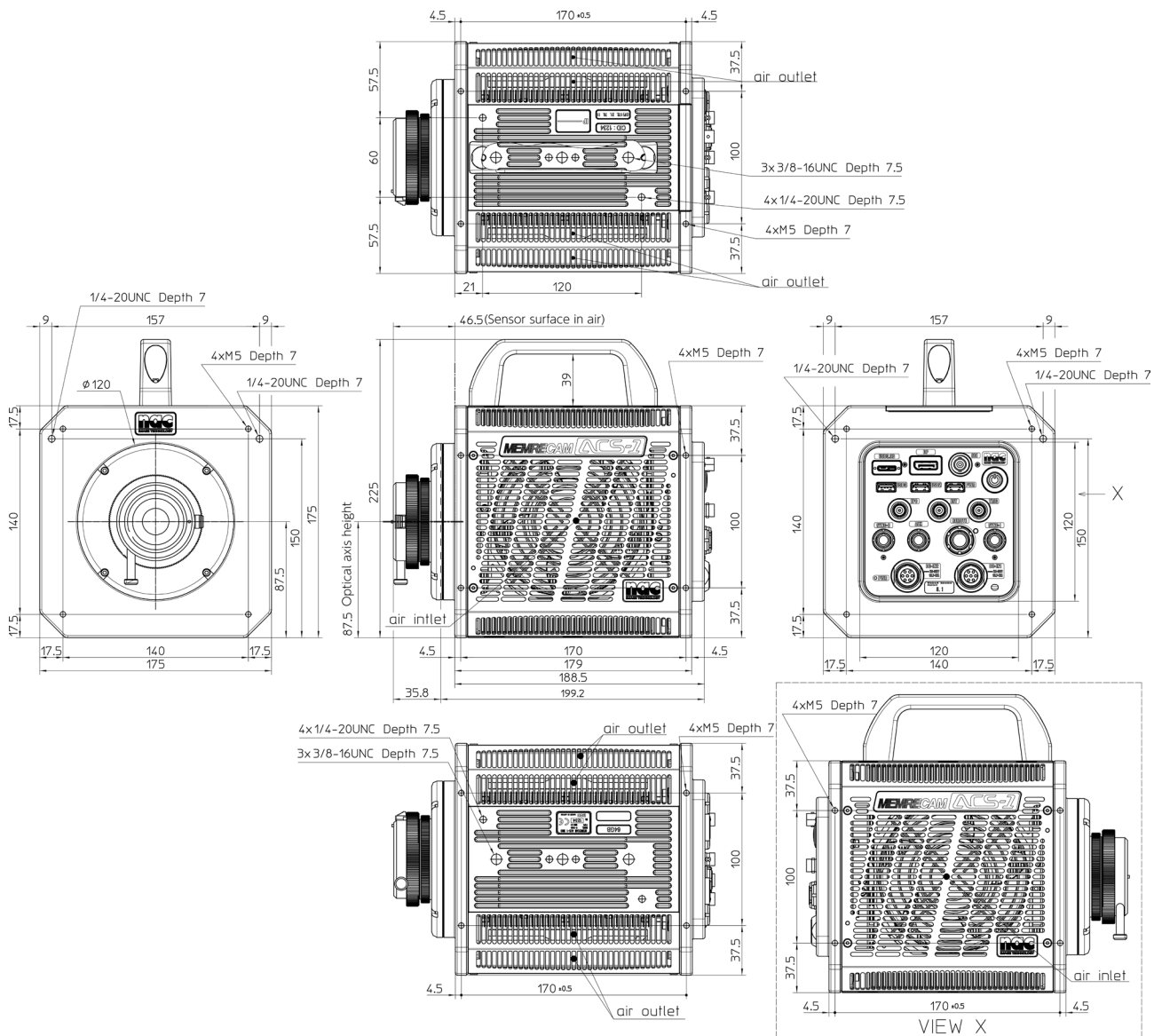
■Drawing of the MEMRECAM ACS-1 Camera (with mounted tripod plate)

Old body

New body

(00457)H

Spec
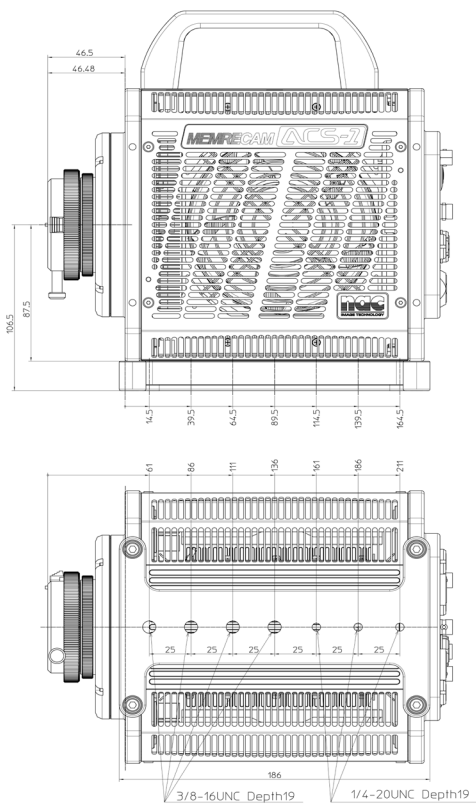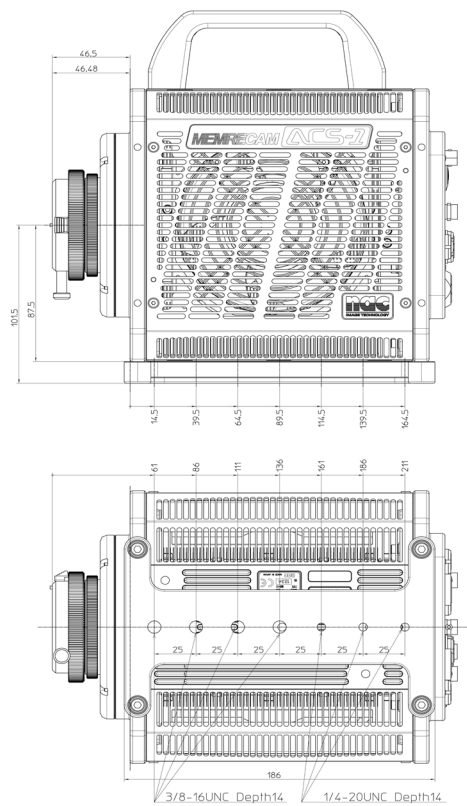
■ Drawing of the AC Adapter

11

Index

Index

(00457)H

Index

Index

U

V

W

Index

Revision History

(00457)H

ACS-1 User's Manual Revision History

Revision	Date of issue	Changes
A	February 2019	First edition
B	November 2019	Compatible with ACS firmware version 2.05.
C	January 2020	Compatible with ACS firmware version 2.10. Contents of ACS-1 M60, M60E, M40, M40E, M30 and M30E were added.
D	April 2020	Compatible with ACS firmware version 2.11. Preset tables are separated as separate manuals.
E	August 2020	Compatible with ACS firmware version 2.12. Change USA Contact Information.
F	July 2021	Compatible with ACS firmware version 2.14. Added Boost 4 mode function to ACS-1 M60/M60E/M40/M40E.
G	March 2023	Change European Contact Information.
H	February 2024	Contents of ACS-1 M30E and M30 were added. Change Contact Information.

12

Contacts

Contacts

Contacts

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Website:	https://www.nacinc.jp/

■ For the other regions

Website:	www.nacinc.com/contact/

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(00457)H